GLOBAL HEALTH & GREEN ECONOMY:
ROLE OF BIOCHEMISTRY & MOLECULAR BIOLOGY

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UNIVERSITY OF PORT HARCOURT

THEME:

GLOBAL HEALTH & GREEN ECONOMY:
ROLE OF BIOCHEMISTRY & MOLECULAR BIOLOGY

BOOK OF ABSTRACTS

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SUB-THEME 1

MEDICAL BIOCHEMISTRY

NSBMB/UPH/MB/001

Butylated Hydroxytoluene Is Protective Against Sodium Arsenite-Induced Hepatorenal Toxicities In Male Wistar Rats

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ABSTRACT

Arsenic is one of the major global environmental contaminants. Sodium arsenite ($NaAsO_2$), one of the compounds of arsenic is a very toxic compound. Long term exposure to $NaAsO_2$ causes various detrimental effects on organs of the body such as liver, kidney, testes and brain tissues. Butylated hydroxytoluene (BHT), a synthetic antioxidant can retard the deleterious effects of free-radical-induced damage. In this study, we examined the chemo-protective effect of BHT on $NaAsO_2$ induced hepatorenal toxicity in male wistar rats. Rats (n=49, 120±10g) were randomly grouped into seven treatment groups of 7 animals each: group 1 and 2 serves as the negative control and were administered corn oil and distilled water respectively, group 3 $NaAsO_2$ alone (2.5 mg/kg); Group 4 BHT alone (25 mg/kg); Group 5 BHT only (50 mg/kg); Group 6 BHT+ $NaAsO_2$ (25 mg/kg + 2.5 mg/kg), and BHT+ $NaAsO_2$ (2.5 mg/kg + 50 mg/kg) for 14 days. Markers of liver and kidney functions, inflammation, oxidative stress and antioxidant profiles of liver and kidney were assayed spectrophotometrically. Results obtained revealed that exposure to $NaAsO_2$ caused a marked increase in the serum levels of AST, ALT, ALP activities, and similar result was obtained for urea and creatinine levels in the serum. Furthermore, there was a significant increased oxidative stress markers such as xanthine oxidase (XO) and lipid peroxidation (MDA) and inflammatory markers such as myeloperoxidase (MPO) and nitric oxide (NO) with a concomitant decrease in antioxidant markers such as superoxide dismutase (SOD). Glutathione-S-transferase (GST), and catalase in the group exposed to $NaAsO_2$ alone. Conversely, there were reversals of the deleterious effects in the groups co-exposed to $NaAsO_2$ and BHT. In conclusion, $NaAsO_2$ exposure causes an increase in inflammatory and oxidative stress signals, but these deleterious effects were ameliorated with the administration of BHT.

Key words: Butylated hydroxytoluene (BHT), Antioxidants, Free-radicals, Arsenic, Hepatotoxicity, Nephrotoxicity.

NSBMB/UPH/MB/002

Comparative Anti-Anemic Activity Of *Eruca Sativa* And Its Combination With *Telferia occidentalis* Against Aluminium Chloride Induced Anemia In Albino Rats.

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ABSTRACT

Anemia is characterized by insufficient red blood cells and hemoglobin to transport oxygen to the body tissues. The causes of anemia include deficiencies in iron, vitamin B_{12}, or folate, chronic disease, and blood loss. Intravenous administration of aluminum chloride in rats has been reported to result in reduced red blood cell count, hemoglobin levels, hematocrit, and lymphocyte values. This study investigated the reversible effects of Eruca sativa and its combination with Telferia accidentalis on these hematological modifications and decreased antioxidant activities associated with aluminum chloride. The study revealed that oral treatment with Eruca sativa, particularly at a higher concentration (400mg/kg), normalized the levels of antioxidant enzymatic components and protected against aluminum chloride-induced anemia and oxidative stress. However, an imbalance in reactive oxygen species production and antioxidant enzymes was observed at higher concentrations of Eruca sativa in combination with Telferia accidentalis, suggesting potential toxicity with excessive herb intake. Eruca sativa, especially at a dose of 400mg/kg, and its combination with Telferia accidentalis demonstrated protective effects against aluminum chloride-induced damage in rodents. The results showed that high concentrations of Eruca sativa alone (400mg/kg) and low concentrations in combination with Telferia occidentalis (200mg/kg) demonstrated significant anti-anemic effects. The synergistic effect of the herbs in combination suggests their potential as supplements to synthetic iron preparations and alternative treatments for anemia caused by blood loss.

Keywords: Aluminum chloride, Anemia, Hematological parameters, Antioxidant

NSBMB/UPH/MB/003

Modulation Of Rat Liver Mitochodria-Mediated Cell Death By Certain Solvent Fractions Of *Ocimum gratissimum* (L) Leaf Extracts.

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ABSTRACT

Dysregulated apoptosis has been implicated in several diseases. *Ocimum gratissimum* (OG) has been engaged in folklore medicine for the treatment of many ailments. Nonetheless, its effect on modulation of apoptosis has not been unraveled. Therefore, the study was aimed at investigating the effects of OG leaf extracts on mitochondrial membrane permeability transition (mPT) pore opening in rat liver. The OG leaves were obtained from Bodija Market, Ibadan, authenticated at Department of Pharmacognosy, University of Ibadan (DPIU 1504), air dried, pulverised and extracted with methanol to obtain its extract (MEOG). The MEOG was successively fractionated using chloroform, ethyl acetate and methanol to obtain their fractions (CFOG, EAFOG and MFOG respectively). The mPT pore was estimated spectrophotometrically at λ_{540nm}. *In vitro* results revealed that varying concentrations (10µg/ml, 30µg/ml, 50µg/ml and 70µg/ml) of MEOG, CFOG and EAFOG have no effect on the mPT

pore in the absence of calcium. But in the presence of calcium, these fractions exhibited inhibitory functions to a varying extent with CFOG having the highest inhibitory effect (82.4%), followed by EAFOG (78.3%) and MEOG with the least efficacy (31.4%). There was no cytochrome c release and ATPase activity in mitochondria treated with MEOG, CFOG and EAFOG. CFOG has the highest percentage inhibition (67%) of Fe^{2+}-induced lipid peroxidation among the fractions tested. However, MFOG significantly enhanced mPT pore induction, cytochrome c release and ATPase activity. The findings reported in this study suggest that OG leaf methanol extract and its fractions are involved in inhibiting calcium-induced mPT pore opening and thus may be an excellent chemopreventive agent in cells where apoptosis is upregulated such diabetes mellitus and neurodegenerative disorders. The ameliorating effect of the extracts on lipid peroxidation may also suggest its antioxidant capacity and therefore may be used to prevent disease associated with oxidative stress and inflammation.

Key: Membrane permeability transition pore, *Ocimum gratissimum*, apoptosis

NSBMB/UPH/MB/004

Enhancing Hematological indices and Antioxidant Vitamins in Malnourished Rats: The Impact of Camel Milk

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ABSTRACT

Malnutrition remains a global health challenge especially in underdeveloped and developing countries, necessitating dietary interventions to address its complex etiology and diverse manifestations. This study investigated the potential outcome of milk supplementation on hematological indices and antioxidant vitamin levels in malnourished female albino rats. Using controlled experimental design, malnutrition was induced by exclusive administration of cassava garri and water only for three weeks, followed by 4 weeks dietary interventions, comprising camel milk and standard diet. Hematological parameters were evaluated with automated hematology analyzer, while antioxidant vitamins were assayed using a spectrophotometric method. A significant alteration in hematological indices and antioxidant vitamin status was observed in the malnourished rats. Following camel milk supplementation, immune function and oxygen carrying capacity of blood was improved evidence from significance increased in red blood cell count (RBC), hematocrit (Hct), mean corpuscular volume (MCV), and white blood cells (WBC) in camel milk supplemented group. Additionally, camel milk supplementation resulted in significant increase in serum vitamin E level ($P<0.05$). Overall, the study provided valuable insights into the varied effects of camel milk supplementation on hematological indices and antioxidant vitamins levels in malnourished rats. Thus, suggesting the potential of camel milk as a good dietary intervention for addressing malnutrition and improving health conditions in vulnerable populations.

Keywords: Malnutrition, camel milk, hematological indices, antioxidant vitamins.

NSBMB/UPH/MB/005

In Silico And In Vitro Identification Of Inhibitory Properties Of Some Antihelminthic Drugs On Alkaline Phosphatase

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ABSTRACT

The aim of this study was to carry out kinetic and in silico evaluation of benznidazoles and levamisole on the hydrolytic activity of rat hepatic alkaline phosphatase. Spectrophotometric method was used to assay for the enzyme activity in the absence and presence of the drugs. Maximum rate of reaction (Vmax) and Michaelis-Menten constant (Km) were estimated using double reciprocal (Lineweaver-Burke) plots of the specific activity of the enzyme against the substrate concentration. In silico simulations utilized computational tools to predict the binding interactions of levamisole and albendazole with the active site of rat hepatic alkaline phosphatase. The presence of levamisole at 0.1% w/v slightly reduced the Km of the enzyme from 0.942 mM to 0.823 mM while at 0.5% w/v and 1% w/v, the Km of the enzyme increased from 0.942 mM to 1.342 mM and 1.043 mM respectively.The presence of benznidazoles at 0.1% w/v and 0.5% w/v increased the Km of the enzyme from 0.942 mM to 0.9633 mM and 0.975 mM respectively. The docking score, XP GScore and prime energy values of the interaction of levamisole with rat tissue nonspecific (hepatic) alkaline phosphatase were -3.344, -3.606, and -3034.23 respectively xiv while the docking score, XP GScore and prime energy values of the interaction of benznidazoles with rat tissue non-specific alkaline phosphatase were -2.234, -2.888, and - 20963.88 respectively. Also, the study revealed that levamisole at 0.1% w/v noncompetitively inhibited rat hepatic alkaline phosphatase activity while at 0.5% w/v and 1% w/v, inhibited rat hepatic alkaline phosphatase activity by mixed-type mode of inhibition. Also, it was revealed that benznidazoles at 0.1% w/v non-competitively inhibited rat hepatic alkaline phosphatase activity while at 0.5% w/v, inhibited rat hepatic alkaline phosphatase activity by mixed-type mode of inhibition and at 1% w/v, non-competitively inhibited rat hepatic alkaline phosphatase activity. The in silico evaluation showed that levamisole has a higher inhibitory effect compared to benznidazoles. This study demonstrates that levamisole is a potent inhibitor of tissue non-specific alkaline phosphatase while benznidazoles slightly inhibited the enzyme despite being in antihelminthic class of drug.

Keywords: alkaline phosphatase, in silico, inhibition

NSBMB/UPH/MB/006

Inhibitory Effects Of Aqueous Extracts Of *Hibiscus Sabdariffa* Calyx Combined With *Zingiber officinale* AND *Allium sativum* On α-Amylase And α-Glucosidase

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ABSTRACT

Diabetes mellitus (DM) continues to constitute a major public health burden causing significant mortality despite huge global spending on different management strategies. Herbs like *Hibiscus sabdariffa* are used locally for the treatment of DM. The benefit of its use when combined with common spices in diabetes is however yet to be evaluated. We investigated the effect of aqueous extract of *Hibiscus sabdariffa* combined with spices (*Zingiber officinale or Allium sativum)* on diabetes mellitus. Two hundred (200 g) *Hibiscus sabdariffa, Zingiber officinale* and *Allium sativum* were separately extracted by boiling for 20 minutes at 100 ^{0}C in water (2000 ml), sieved and lyophilized to obtain crude extracts. The extracts were reconstituted into different combinations. The α-amylase and α-glucosidase inhibitory potentials of *H. sabdariffa, Z. officinale* and *A. sativum* extracts, as well as extracts containing combinations of *H. sabdariffa* with *Z. officinale*, and *H. sabdariffa* with *A. sativum* were determined at different concentrations using standard methods. Acarbose was used as the standard and the inhibitory activity was also determined. IC_{50} was calculated and used to determine the extract and combination with the highest inhibitory activities. The result obtained showed that *Hibiscus sabdariffa* combined with *Zingiber officinale* had lowest IC_{50} which implies that it had the highest inhibitory activity compared to Acarbose for both α-amylase and α-glucosidase inhibitory activity. The positive effect of combination of *H. sabdariffa* calyx and *Z.officinale* shows that it may be an alternative in the treatment of diabetes because it exerted effects similar to that of Acarbose. The antidiabetic properties of the combination of *H. sabdariffa* and *Z. officinale* may be assessed *in vivo* to further explore the combinatorial efficacy of these extracts.

Key words: Diabetes Mellitus, α-amylase, α-glucosidase, Acarbose, *Hibiscus sabdariffa, Zingiber officinale, Allium sativum*

NSBMB/UPH/MB/007

Biochemical Effect of Ethanol Extract of *Dialium guineense* Stem Bark on Total Protein and Lipid Profile of Normal Wistar Rats

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ABSTRACT

Screening of potential drug candidate requires that it effect under normal biological/physiological condition is established. The present study investigated the biochemical effect of ethanol extract of *Dialium guineense* (EEDG) stem bark on total protein (TP) and lipid profile in normal rats. Adult male rats (Wistar strain, n = 10) weighing 150 to 180 g (mean weight = 165 ± 15 g) were assigned to two groups of five rats each: control and observation groups. The observation group received 1000 mg/kg body weight, bwt, EEDG stem bark orally for twenty-eight days, and assays were performed on weekly basis. The results showed that the medicinal plant extract did not significantly alter the concentrations of TP and total cholesterol (TC) between the two groups ($p > 0.05$), but it reduced the concentrations of triacylglycerol (TG), very low-density lipoprotein cholesterol (VLDL-C), and low-density lipoprotein cholesterol (LDL-C), significantly and time-dependently ($p < 0.05$). In addition, there was significant increase in high-density lipoprotein cholesterol (HDL-C) concentration, when compared with control group ($p < 0.05$). These results suggest that EEDG stem bark can be used as crude drug in the management of diseases caused by elevated plasma lipids.

Keywords: Crude drug, Disease, Lipids, Medicinal plant, Total protein.

NSBMB/UPH/MB/008

A Cross Sectional Study On The Prevalence, Dietary Practice And Associated Risk Factors Of Gestational Diabetes Mellitus Among Pregnant Women In General Hospital Dutse

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ABSTRACT

Maternal health associated with Gestational Diabetes Mellitus (GDM) has been gaining significant research attention due to its severe risk and adverse health effects. GDM is the leading health disease in pregnant women. It is the most common metabolic disease and it can affect up to 25% of women during pregnancy. The present study investigated prevalence and the associated risk factors of gestational diabetes mellitus among pregnant women in General Hospital, Dutse, Jigawa state, Nigeria. A cross-sectional study was carried out, where known diabetic women were excluded from the study. An oral glucose tolerance test was used to determine the existence of gestational diabetes. MUAC and biochemical analysis were used to assess the nutritional status. Majority of the participants were married (96.7%) and aged between their twenties and mid-twenties (45.0%). The average number of pregnancies per participant was 2–3 (25.0%), with most women having 2–3 children. The study identified a minority with family histories of diabetes (8.3%), gestational diabetes in previous pregnancies (6.7%). Dietary analysis revealed higher consumption of grains, cereals, fats and oils, alongside lower consumption of fruits, vegetables, and eggs, indicating dietary inadequacies among the pregnant women. Only a quarter of the participants met the recommended minimum dietary standards. Notably, the prevalence of GDM was 21.7%, and a family history of diabetes or prior GDM emerged as significant risk factors ($p<0.05$). The study underscored relationships between various food groups and GDM status ($p<0.05$). In conclusion, the study clearly shows there is high prevalence of gestational diabetes among the pregnant women attending General Hospital Dutse, Jigawa State (21.7%) and poor dietary practice influenced the risk of Gestational Diabetes.

Keywords: Diabetes, Gestational Diabetes, Hyperglycemia, Pregnancy, Metabolic diseases

NSBMB/UPH/MB/009

Hepatotoxicty Studies And Phytochemical Consitutents Of Hydro-Methanolic Extracts Of *Carica Papaya* Seeds In Male And Female Wister Rats

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ABSTRACT

Carica papaya is a species of fruit-bearing plant in the *Caricaceae* family. The plant has been utilized in traditional medicine for a variety of ailments, with the juice of its green leaves being consumed as a beverage for the treatment of malarial fever, digestive disorders and other gastrointestinal tract disorders. Fresh seeds of *Carica papaya* were collected from fruit seller's site in local market Katsina State. The plant was identified and authenticated by a Botanist from the Department of Biological science, Al-Qalam University Katsina. A sample of sixty (60) healthy male and female Wistar rats weighing 120+2.33 g were procured from the Nigerian Institute of Transponomiasis in Kaduna, Nigeria. Phytochemical constituents of the extract were determined quantitatively using standard UV-spectrophotometric methods. Biochemical assay was conducted using standard method of colorimetric. The hematology parameters were determined using Hematology Analyzer (Medonic CA 620 VET, Stockholm, Sweden). The results of phytochemical shows that alkaloids have the highest value of (24.03±0.08mg/100g) whereas tannins have the least value (0.02±0.01mg/100g). Also the results of biochemical assay shows that there is increase in serum ALP concentration which was significantly different from that of control at ($p<0.05$) after the oral administration of hydro-methanolic of extract of *C. Papaya* seed (50mg/kg, 100 mg/kg and 200mg/kg. Serum samples from rats treated with C. papaya hydro-methanolic extract (50mg=kg, 100mg=kg, 200 mg=kg) showed an increase in the enzyme AST concentration. The increase in enzyme concentration was dose dependent and significantly different from that of the control group ($p<0.05$). The result in (table 4.1) shows a significant decrease ($p<0.05$) in the level of urea in group B and C after administration of 50mg and 100mg of Carica papaya seed extract (CPSE) when compared to control. While group D showed a significant increase after administration of 200mg of CPSE when compared to control. However only bicarbonate, uric acid and K^+ shows no significant increase or decrease in all the groups after administration of 50mg, 100mgand 200mg when compared to control.

Key: *Carica Papaya and Wistar rat.*

NSBMB/UPH/MB/010

Effect of Temperature on the Rate of Reticulocyte Maturation

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ABSTRACT

Reticulocyte studies play a crucial role in the management and treatment of hematological diseases like sickle cell anemia, they are produced in a bone marrow and undergo maturation to produce mature red blood cells. Although this process has been studied extensively, there is still a considerable gap in understanding the process. Here we measured the rate of reticulocytes maturation before and after enrichment at room temperature and on ice. We counted the cells that remains after an interval 30 minutes for 2 hours and 30 minutes. From our results, we observed a linear decrease of the number of reticulocytes with an increase in time. For the enriched sample at room temperature, 10.5% and 68.4% matured at 3 and 4.5 hours after the sample collection and enrichment respectively, while for the one on ice, 9.5% and 66.7% matured at the 3 and 4.5 hours respectively. For the unenriched sample at room temperature, 17.9% matured at 2 hour and 60.7% matured at 3.5 hours after the sample collection. The result also shows that 16.1% and 74.2% matured on Ice at 2 hour and 3 hour respectively. We conclude that the reticulocytes mature faster at room temperature than on Ice. Although for the unenriched reticulocytes on ice, there was a high percentage of reticulocytes lost compared to the enriched one on Ice. This result could provide an insight on a means to understand various physiological and pathological haemoglobinopathies.

Keywords: Reticulocytes, Maturation, Blood, Genotypes, Enrichment

NSBMB/UPH/MB/011

Association Of Maternal Lipid Profile, Nutritional Status And Gestational Diabetes Mellitus In Pregnant Women

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ABSTRACT

This study analyzes the changes in lipid profile in patients with gestational diabetes. For this study, pregnant women with type 1 or type 2 diabetes, chronic diseases such as, tuberculosis, cardiovascular diseases, and renal failure and other pregnancy complications were excluded. An oral glucose tolerance test was used to determine the existence of gestational diabetes among the study participants. Serum Iron, Zinc, Calcium, Albumin and Lipid profile markers including total cholesterol (TC), triglycerides (TG), high-density lipoprotein (HDL), and low-density lipoprotein (LDL) were determined using the appropriate standard biochemical methods. The study revealed elevated levels of total cholesterol (TC) (80% high TC as against 2.2% with normal TC), triglycerides (TG) (41.4% high TG as against 2.3% with normal TG), high-density lipoprotein (HDL) (55.6% high HDL as against 7.1% with normal HDL), and low-density lipoprotein (LDL) (91.7% high LDL as against 4.2% with normal LDL) in patients with GDM. The participants demonstrated variations in key health indicators, with mid-upper arm circumference (MUAC) (69.6%) and albumin (71.7%) within the normal range. The calcium (2.22 mmol/l) levels slightly exceeding normal ranges. However, iron (117.76mg/dl) and zinc (77.00 mg/dl) levels remained within normal levels. The study underscored relationships between lipid profile, Zinc, Albumin and GDM status ($p<0.05$). Conclusively, pregnancies affected by GDM are characterized by dyslipidemia, thus advanced lipid testing may indicate disturbed lipid homeostasis in GDM.

Keywords: Diabetes, Gestational Diabetes, Hyperglycemia, Pregnancy, Metabolic Disease

NSBMB/UPH/MB/012

Safety Profile And Free Radical Scavenging Capacities Of Methanol Extract Of *Monodora myristica* Seed Extract On Testosterone Induced Benign Prostatic Hyperplasia In Male Rats

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ABSTRACT

The global increase of Benign Prostatic hyperplasia has significantly risen worldwide, predominantly impacting elderly men causing the proliferation of epithelial and stromal cells within the prostate. The objectives of this study was to determine the safety potential of methanol extract of *Monodora myristica seed* (MEMM) on Testosterone – induced Prostatic Hyperplasia in male rats. Phytochemical and acute toxicity study was conducted on the seed of *Monodora myristica* using standard methods. Thirty-six (36) male albino rats were allocated into five groups of 6 rats each. Group 1 the normal control, received 1ml normal saline orally daily and a subcutaneous injection of 1ml Olive oil, Group 2 the disease control received 5mg/kg testosterone propionate and 1ml olive oil orally, Group 3 the Standard drug control, received 5mg/kg each of testosterone propionate and 5mg/kg Finasteride. Groups 4 and 5, both received 5mg/kg testosterone propionate along with 50mg/kg of MEMM. Testosterone administration was performed via Subcutaneous injection every other day. At the conclusion of 28 experimental treatments, the animals were euthanized using cervical dislocation and blood was collected via cardiac puncture for biochemical analysis. Phytochemical studies revealed elevated levels of Flavonoids and reduced level of Saponins. An acute toxicity test yielded a result of 1500mg/kg. Prostate weight and PSA levels markers for BPH significantly decreased ($P< 0.05$) in treated BPH rats compared to diseased control group. Superoxide dismutase, Body weight, Catalase and Glutathione peroxidase activities were significantly increased ($P< 0.05$) in all the treatment groups compared to the disease control rats. There were no significant changes observed in the mean relative weight of the selected vital organs. This study suggests that Monodora *myristica* may contain important phytochemical constituents with potential benefits in preventing or suppressing the development of BPH and could be useful in treatment.

Keywords: Monodora *myristica*, antioxidant, benign prostrate hyperplasia, testosterone, phytochemicals

NSBMB/UPH/MB/013

Exhibition of antisickling synergism by aqueous *Khaya senegalensis* and *Diospyros mespiliformis* Stem barks *extract,* its effect on Liver and Kidney function markers, and Haematological parameters in rats

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ABSTRACT:

This study investigated antisickling properties of DM and KS, and safety profile in rats. The objectives of this study were to assess in vitro antisickling activity of crude, fractions and chromatographic sub- fractions of DM and KS stem barks, determine the toxicological effects of the most effective sub-fractions in rats and evaluate effect of the sub-fractions on haematological parameters in rats The antisickling effects of DM and KS were assessed using standard methods (Red Blood Cells Sickling Reversal Test, polymerization inhibition test and Osmotic fragility test). Ten groups of 4 rats each were treated with the most effective sub-fractions orally daily for 8 weeks for safety profile (lipid profile, haematological parameters and organ function indices) using standard methods. Data were analyzed using one-way Analysis of Variance and Turkey's Multiple Range Test at $p<0.05$. The findings of the study were that: Aqueous crude extracts of DM and KS showed antisickling activity by reversing induced sickling by 62.74 and 51.12 % respectively. Sub-fractions 3 and 4 of DM (F3DM and F4DM) and sub-fractions 4, 6 and 7of KS (F4KS, F6KS, F7KS) exhibited the best antisickling activities. F6KS and F4DM significantly ($p<0.05$) reduces activities of serum ALT, AST and ALP. F4DM reduces the level of creatinine compared to the naïve control. F6KS significantly ($p<0.05$) increases serum level of HDL Cholesterol and significantly ($p<0.05$) reduces serum level of LDL Cholesterol. F4DM significantly ($p<0.05$) increases erythrocytes, haemoglobin, white blood cells and Lymphocytes counts. The study concluded that F4DM and K6KS exhibited in vitro antisickling activities and antioxidant activities. The study recommends that F4DM and K6KS be explored as safe alternative in the management of sickle cell disease. A synergistic anti-sickling activity exists between the two extracts.

Keywords: Sickle cell disease, *Khaya senegalensis*, *Diospyros mespiliformis*, anti-sickling activities

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The Antimicrobial Properties of Aqueous extracts from seeds and pulps of *Artocarpus. Heterophyllus*

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ABSTRACT

The medicinal (antimicrobial) potentials of the seeds and pulp of *Artocarpus heterophyllus* were evaluated to unravel their wild usages locally for treatment of several diseases. The zone of inhibition of extracts on some bacterial and fungal strains was evaluated. In the present study, the antimicrobial activity of seeds and pulp of *Artocarpus heterophyllus*(an ethnomedicinal plant) was evaluated for potential antimicrobial activity against medically important bacterial and fungal strains. The antimicrobial activity was determined in the extracts using agar disc diffusion method. The antibacterial and antifungal activities of extracts (at 25, 50, 100 mg/l) of seeds and pulp of *Artocarpus heterophyllus* were tested against fungi; Candida Specie, Aspergillus specie, Fusarium specie, Rhizopus specie and bacteria: Bacillus specie, Escherichia specie, Shigella specie, Staphylococcus specie, Samonella specie. The evaluated antimicrobial properties of the seed and pulp on (fungi: Candida Specie, *Aspergillus* specie, *Fusarium* specie, *Rhizopus* specie and bacteria: *Bacillus* specie, *Escherichia* specie, *Shigella* specie, *Staphyilococcus* specie, *Samonella* specie) revealed that the seeds of *A.heterophyllus* had a higher zone of inhibition when compared to the antifungal drug (Nystatin) and antibiotic drug (Chloramphenicol) . The results also shows that 100mg/L concentration gave higher inhibition zones for all sampled extract on both bacteria and fungi. This however, is suggestive that 100mg/L of the sampled extracts could be best used as an antibacterial and anti- fungal agent. This research work shows that it is clear that both the seed and pulp of *A.heterophyllus* have essential potential ingredients that could be used in the treatment of fungal and bacterial infections, which could give a lead for further pharmaceutical research. The anti -microbial activity of these ethnomedicinal plant could be attributed to the presence of various secondary metabolites, reported in previous research.

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Levonorgestrel Induced a Dose- and Time- Dependent Modulation in some Hormones Associated with Reproduction and Implantation in Experimental Animal Model

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ABSTRACT

Increased sexual activities among adolescents have resulted in the indiscriminate use of contraceptives. This study assessed the toxicological effects of levonorgestrel (LNG) intake on reproductive and vital organs in a rat model. Sixty Wistar rats weighing between 110 and 120 g were randomized into three groups (n = 20). Groups A and B were administered 1.83 mg/kg BW of LNG once and twice a week respectively, and group C served as the control. Five animals from each group were sacrificed at 30, 60, and 90 days. The hormonal effect of LNG was assessed by measuring the serum levels of progesterone (P4), estradiol (E2), luteinizing hormone (LH), and follicle-stimulating hormone (FSH) using the ELISA technique. Effects of LNG on fertilization, implantation, and hence fertility was assessed by measuring progesterone-associated endometrial protein (PAEP), leukemia inhibitory factor (LIF), prolactin (PRL), and sex hormone-binding globulin (SHBG) using ELISA. P4 was

significantly elevated in the treated group only at 30 days of treatment. LH and FSH were markedly elevated with LNG treatment, while E2, PAEP, LIF, PRL, and SHBG were significantly decreased in a dose- and time-dependent manner.

Keywords: Hormonal interferences, Levonorgestrel, Fertilization, Implantation, Contraceptive

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Levonorgestrel Induced Hepatotoxicity and Nephrotoxicity in Female Wistar Rats

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ABSTRACT

This study was designed to evaluate the impact of indiscriminate use of a commercially available LNG on liver and kidney function using Wistar rats as an experimental model. Sixty (60) rats weighing 110 – 120 g were purchased and randomly placed in three groups; n= 20: Group A was treated with a human dose equivalent of 1.83 mg/kg/BW once weekly, Group B was given the same dose twice weekly while Group C served as control administered equal vehicle volume of 0.2 ml on treatment days. The drug was procured from a government-approved pharmacy in Ibadan, Nigeria. At the end of each month of treatment, 5 rats from each group were sacrificed, liver and kidney were collected, weighed, and processed for histological and biochemical analyses. The weights of rats were measured before treatment started and before each batch of sacrifice. The relative organ weights and histopathological assessments of the liver and kidney were determined. Hepatotoxicity was determined by measuring aspartate aminotransaminase (AST), alanine aminotransaminase (ALT), AST:ALT ratio, alkaline phosphatase (ALP), Total protein and gamma-glutamyl transferase (GGT) using standard spectrophotometric methods. Similarly, nephrotoxicity was determined via cystatin C, urea, creatinine, BUN, and the BUN-creatinine ratio levels. Administration of LNG to rats especially twice weekly caused a significant reduction in the relative weight of the liver, and total protein while concentrations of AST, ALT, ALP, GGT, Cystatin C, creatinine, and urea were significantly elevated in the serum with a concomitant decrease in the tissues. The histopathological examination showed hyperplastic degeneration, disseminated congestion, and extensive tubular necrosis in the liver and kidney of the treated groups. The data obtained from this study showed a dose- and time-dependent effect on the organs, especially the liver and this compromise was more pronounced in the rats treated twice weekly. It therefore suggests that excessive intake of LNG may result in some degree of liver function impairments.

Keywords: **Levonorgestrel, Hepatotoxicity, Nephrotoxicity, Contraceptives**

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Blood Lead Level, Serum Acetylcholine and Urine Porphobilinogen in Nigerian Children with Austism Spectrum Disorder

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ABSTRACT

Autism spectrum disorder (ASD) is a neurodevelopmental disorder (NDD) characterized by communication and behavioural deficits. Despite significant research efforts, diagnosing and managing Autism Spectrum Disorder (ASD) remains a complex medical challenge. Heavy metal toxicity has been suggested to interact with altered neurotransmission, potentially contributing to ASD development. Therefore, this study examined blood lead level (BLL), serum acetylcholine (ACh), and urine porphobilinogen (PBG) levels in Nigerian children with ASD. Forty participants aged 3 to 12 years, including 13 children with ASD as cases, 14 children with other NDDs excluding ASD (positive controls), and 13 neurotypical children (negative controls), were recruited. BLL was measured using atomic absorption spectrophotometry (AAS), while serum ACh and urinary PBG levels were assessed using ELISA and modified Mauzerall-Granick methods, respectively. The study revealed no significant difference in BLL between the cases and controls. However, urinary PBG levels were significantly higher in cases (4.03 ± 0.57 µmol/mmol creatinine) compared to negative controls (3.29 ± 0.46 µmol/mmol creatinine). Additionally, the study found significantly lower serum ACh levels in the cases (588.55 ± 239.09 pg/ml) and positive controls (439.10 ± 260.69 pg/ml) compared to the negative controls (843.19 ± 339.63 pg/ml). Importantly, no significant correlation was found between BLL, PBG, and ACh. Although this study found no correlation amongst the parameters investigated, it identified elevated urinary PBG levels and decreased serum ACh levels in children with ASD compared to controls. This supports the well-established implication of heavy metal toxicity and its potential debilitating effects on neurotransmission, especially on cholinergic neurotransmission, in the etiology of ASD. Further research is needed to explore the specific mechanisms at play.

NSBMB/UPH/MB/018

Acetaminophen Potentiates Antioxidant Property Of Glutathione In Vitro; Its Possible Mechanism Of Action As An Analgesic

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ABSTRACT

Although acetaminophen (ACE) is an over-the-counter drug with a renowned analgesic activity, little is known about its possible analgesic mechanism of action vis-à-vis its interaction with glutathione (GSH). In contrast, there is avalanche of literatures attributing acetaminophen toxicity to the interaction of its metabolite N-acetyl -P-quinonimine (NAPQI) with glutathione. Since one of the aetiologies of pain is through oxidative stress, the present study sought to evaluate the antioxidant properties of acetaminophen (ACE) as a compound, the comparative antioxidant properties of acetaminophen (ACE), glutathione (GSH) and their 1:1 mixture (ACE/GSH) in liver homogenates. The possible antioxidant mechanisms of acetaminophen, glutathione and the mixture of acetaminophen and glutathione were assessed by measuring their ability to inhibit lipid peroxidation in liver tissues of rats using $Fe^{2+,}$ sodium nitroprusside (SNP), 3-nitropropionic acid (3-NPA) and Quinolinic acid as oxidants; their comparative abilities to reduce Fe^{3+}; Free radicals scavenging abilities and Fe^{2+} scavenging abilities. It was observed that acetaminophen inhibited lipid peroxidation in hepatic tissues induced by various oxidants such as iron (ii) ion, sodium nitroprusside (SNP), hydrogen peroxide, 3-nitropropionic acid (3-NPA) and quinolinic acid while glutathione did not exhibit significant inhibition on lipid peroxidation, the mixture had greater inhibition on lipid peroxidation. The result indicated that glutathione potentiates the antioxidant properties of acetaminophen in vitro. The result also revealed that free radical scavenging ability of glutathione was higher than that of acetaminophen while the mixture scavenging ability was lower when compared to the control and the Iron chelating ability of each of acetaminophen and glutathione was not significant while the mixture showed a considerable chelating ability. Taken together, acetaminophen has antioxidant properties whose effect is more pronounced with its interaction with glutathione which is a possible mechanism of its analgesic properties since pain is intrinsically linked to oxidative stress.

Keywords: acetaminophen, glutathione, analgesic.

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Comparative Study Of Serum Lipid Profile Of Android And Gynoid Obese Subjects

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ABSTRACT

Regional adiposity has been observed to have some health effects, with android obesity been the most dangerous than gynoid obesity. The aim of this study is to comparatively evaluate the lipid profile and cardiovascular risk indices of android and gynoid obese subjects in Delta State. A total of two hundred and fifty apparently healthy obese subjects comprising 117 android and 133 android obese subjects were recruited for the study. Total cholesterol, triglycerides, high density lipoprotein cholesterol were analysed by standard methods while low density lipoprotein and cardiovascular risk indices were calculated using appropriate formula. Serum total cholesterol, high density cholesterol and low density lipoprotein were significantly

(p<0.05) lower in android obese subjects than gynoid obese subjects but no significant (p>0.05) difference was observed in very low density lipoprotein and triglycerides. Similarly, atherogenic coefficient (AC), cardiac risk ratio (CRR) and non- high density lipoprotein (NHDL) were significantly (p<0.05) lower, and atherogenic index of plasma lipid (AIP) was significantly (p<0.05) higher among android obese subjects than gynoid obese subjects. Android obese subjects may have high propensity to cardiovascular risk than the gynoid obese subjects because atherogenic index of plasma is a better predictor of coronary heart disease.

Keywords: Obesity, android obese, gynoid obese, lipid profile, Nigeria.

NSBMB/UPH/MB/020

Effects of Methanol Leaf Extract of *Psidium Guajava* on some Biochemical Parameters and Histology of CCL4-Induced Hepatotoxicity in Wistar Rats

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ABSTRACT

This research work focused on the effects of methanol leaf extract of *Psidium guajava* on some Biochemical parameters and histology of CCL4- Induced Hepatotoxicity in Wistar rats. A quantitative screening of the phytochemicals, generally revealed that Alkaloid was the only phytochemical below detectable quantity at 0.37±0.00. Flavonoid was the highest detected Phytochemical at 38.30 ± 0.00mg/100g. Phenol, Tannin and Saponin were moderately high at 21.86 ± 0.00 mg/100g, 10.31 ± 0.00mg/100g, and 7.99 ± 0.00mg/100g respectively. The activities of bioactive markers showed that; The AST activity was significantly lower in the rats feed with feed and water only 19.33±0.33 (Normal control) as compared with the treated groups and as compared with the inoculated but untreated control group 31.33 ± 2.40 . However, there was a significant difference (P > 0.05) in each category of plant extracts as they showed a progressive decrease in the value of AST with increase in concentrations having the least AST activity, 10.00 ± 0.58, in the 1000mg/kg group administered with *Psidium guajava* plant extract. Also, the ALT activity in the control group, untreated group and 1000mg/kg treated group were 11.00 ± 0.58, 34.33 ± 1.86 and 11.00 ± 0.58 respectively. The activity of ALP was similar to that observed in AST and ALT. There was a slightly significant difference (P > 0.05) in the total protein levels when comparing the groups relative to increase in concentrations of the extracts. The level of total protein was highest in 1000mg/kg and lowest in the untreated groups. The reverse was the case with total bilirubin. The urea and creatinine concentration for the treated groups were significantly (p<0.05) lower when compared to the untreated groups. The effects on biochemical parameters demonstrated the lowering of the activity of liver markers (ALT, AST, ALP and TB).

Keywords: *Psidium guajava*, Hepatoxicity, Biochemical, Methanol, Leaf extract, Co-administration.

NSBMB/UPH/MB/021

Effect of administration of Methanol Seeds Extracts of *Salvia Hispanica* on Haematological Parameters and Histopathology in Phenylhydrazine-induced Anaemic rats.

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ABSTRACT

Chia (*Salvia hispanica* L.) is a small seed that comes from an annual herbaceous plant, *Salvia hispanica* L. In recent years, usage of Chia seeds has tremendously grown due to their high nutritional and medicinal values. This study evaluated the phytochemical constituents, and the effect of administration of methanol seeds extracts of *salvia hispanica* on some haematological parameters and histopathological appearance of the liver and kidney in phenylhydrazine induced-anaemic rats. It was observed that intraperitoneal administration of phenylhydrazine decreased haemoglobin concentration, parked cell volume, red blood cells number and haemotocrit. Haematological indices (Hb, PCV and RBC) of the six experimental groups showed that there was a significant ($p<0.05$) decrease in PCV, Hb and RBC levels of the negative control (anaemia untreated) group when compared with the normal control group. There was no significant difference ($p>0.05$) observed in the PCV of extract treated group and standard drug (chemiron) treated group. However, there was a significant ($p<0.05$) increase in the level of PCV, Hb and RBC of the extract treated group compared with the negative control. This may be attributed to its rich phytochemical contents.

Keywords: Salvia Hispanica, Anemia, Phenylhydrazine, Haematological parameters

NSBMB/UPH/MB/022

Screening And Co-Morbid Association Of Visceral Leishmaniasis And Diabetes In Osun State, Nigeria

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ABSTRACT

This sero-epidemiology surveillance was carried out to ascertain VL incidence in Osun State, Nigeria, and to investigate the association of the disease co-morbidity with diabetes *viz-a-viz* implication on biochemical parameters of kidney and liver functions. 272 volunteers across the State were enrolled on this study. All samples were screened for leishmaniasis using capillary, buffy coat and ELISA methods, concurrently. Liver and kidney function parameters were assayed spectrophotometrically and comparisons were made between the methods, and outcome of parameters among seronegative and seropositive participants. SPSS version 22 was used for the statistical analysis. The capillary technique did not detect (0%), the thin buffy coat detected 2 (2.1%) whereas ELISA detected 44 (16.2%) leishmaniasis cases among the participants. There were statistically significant ($p < 0.05$) decreased urea, increased creatinine, elevated alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels in *Leishmania*-infected participants compared to those uninfected. It is interesting to note that urea, creatinine, ALT and AST levels of participants having a co-morbidity of VL-diabetes and VL-diabetic foot ulcer did not change significantly compared to the *Leishmania*-infected participants without diabetes or the foot ulcer. This study indicated that *Leishmania* infection may be a singular factor that perturbs the kidney and liver enzymes. Therefore VL does not show association with diabetes or diabetic foot ulcer co-morbidity in the population studied. There has not been any reported case of VL in Osun State prior to this study. It, therefore, suffices that the infectious disease has hitherto remained un- or mis-diagnosed.

Keywords: Visceral leishmaniasis, surveillance, co-morbidity, buffy coat, kidney function, liver function

NSBMB/UPH/MB/023

Newbouldia laevis Ameliorate Letrozole induced polycystic Ovarian Syndrome (PCOS) In Female Wistar Rats

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ABSTRACT

Polycystic ovary syndrome (PCOS) is the most common gynaecological endocrine disease that causes anovulatory infertility. The current study aimed to explore the possible role of Newbouldia laevis (Ewe akoko), in treating letrozole-induced PCOS in female rats that has similar metabolic and endocrinal criteria of PCOS patients. Twenty five female wistar rats weighing between 180-200g were used. PCOS was induced in rats by administration of letrozole orally (1 mg/kg, per orally) for 21 days. Rats were treated orally with Newbouldia laevis (200 mg/kg/day), (500 mg/kg/day), or metformin (2 mg/100 g/day.) for 14 days after the PCOS induction. PCOS resulted in a significantly higher body weight, ovarian weight, ovarian size, as well as an elevation in serum Follicle stimulating hormones (FSH), Leutinizing hormone (LH), Prolactin, Extradiol, and lipid profile levels, Concentration in the levels of

Lactate and Troponin I in heart homogenate were also elevated. All of these effects were significantly reduced by the Newbouldia laevis administration. Additionally, Newbouldia laevis remarkably inhibited the letrozole-induced oxidative stress in the ovaries, heart and liver by reducing the upraised levels of malondialdehyde and 8-OHDG and increasing the suppressed activities of superoxide dismutase and catalase. Finally, Newbouldia laevis inhibited the elevated activities of Creatine kinase, caspase-3 and the up-regulated inflammatory cytokines TNF-α. Ovarian tissue was collected for paraffin sectioning and hematoxylin and eosin (H&E) staining which shows dense transparent saclike follicles on the ovary surface under the microscope in model groups. Our results proved that Newbouldia laevis ameliorates letrozole-induced PCOS through its antioxidant and anti-inflammatory properties.

Keywords: Polycytic ovarian syndrome, Letrozole, Antioxidant, Anti-inflammatory, Newbouldia laevis.

NSBMB/UPH/MB/024

Ameliorative Potential Of Andrographis Paniculata Aqueous Extract Against Lead Induced Hematological Toxicity In Male Wistar Albino Rats

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ABSTRACT

This study investigated the potential ameliorative effects of *Andrographis paniculata* (AP) on lead induced hematological toxicity in male Wistar albino rats. Thirty rats, weighing 90-120g, underwent acclimatization before being randomly assigned to five groups. Group I served as the control, Group II received lead acetate (40 mg/kg), and Groups III, IV, and V were administered AP at doses of 100 mg/kg, 200 mg/kg, and 300 mg/kg, respectively, in addition to 40 mg/kg of lead acetate. After 28 days, blood samples were collected to assess blood lead levels and hematological parameters. Results showed that rats receiving lead acetate with 300 mg/kg AP had lower blood lead levels, suggesting AP's potential for reducing lead toxicity. Hematological analysis revealed significant differences between control and treatment groups. Lead exposure altered red blood cells and increased white blood cells, platelets (PLT), mean corpuscular hemoglobin (MCH), and mean corpuscular volume (MCV). Higher AP concentrations (200 and 300 mg/kg) restored white blood cells, PLT, and MCH to control levels. Oral AP administration significantly increased neutrophil count while decreasing monocyte and eosinophil percentages, with no significant changes in lymphocyte count. This suggests that AP may have targeted effects on specific blood cell types following lead exposure. In conclusion, this study suggests that aqueous extracts of *Andrographis paniculata* possess protective properties against lead-induced hematological toxicity in male rats. Further investigation is warranted to elucidate the mechanisms underlying these observations, particularly regarding the differential effects on white blood cell types.

NSBMB/UPH/MB/025

The Roles Of Aqueous And Ethanol Extract Of *Vitex Doniana* Leaves On Liver Enzymes And Lipid Profile Of Wistar Albino Rat.

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ABSTRACT

This research work investigated the roles of aqueous and ethanol extract of *Vitex doniana* leaves on liver enzymes and lipid profile of Wistar Albino rats. *Vitex doniana* leaves was obtained from Idiato South in Imo State, rinsed and dried using oven set at 40^{o}C. The dried leaves were ground and weighed. Extraction was carried out using maceration method and dried using water bath. Thirty-Five (35) wistar albino rats were obtained from Department of Biochemistry, Faculty of Science, University of Port Harcourt Animal House and were acclimatized for 7 days. Seven experimental Groups were set up, Group 1 served as control, Groups 2 to 4 were administered 100mg/kg, 200mg/kg and 250mg/kg of aqueous extract of *Vitex doniona* leaves respectively while Groups 5 to 7 were administered 100mg/kg, 200mg/kg and 250mg/kg of ethanol extract of the leaves respectively. Liver enzymes and lipid profile analyses were carried out using standard laboratory methods. The results showed that cholesterol, HDL and LDL of aqueous extract decrease significantly ($p \leq 0.05$) by (10.87% - 18.48%), (8.33% - 13.89%) and (12.79% - 39.53%) for Groups 2 to 4 while the ethanol extract increased the cholesterol, TG, HDL and LDL significantly ($p \leq 0.05$) by (6.52% - 12.50%), (52.54%), (11.11% - 22.22%) and (4.65% - 15.12%) for Groups 5 to 7. The results obtained indicate that aqueous extract of *Videx doniana* gave a better performance compared to ethanol extract and could validates its use in traditional medicinal practice.

Keywords: *Vitex doniana*, Liver enzymes, Lipid profile, Medicinal.

NSBMB/UPH/MB/026

Dennettia tripetala Seed Methanol Extract Modulates Glucose Level and Lipid Profile of Alloxan-Induced Diabetic Male Albino Rats

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ABSTRACT

The study evaluated the effects of *Dennettia tripetala* seed methanol extract (DTSE) on blood sugar and toxicological effect in alloxan-induced diabetes models using male Wistar rats. Thirty (30) male albino rats were divided into six distinct groups for the purpose. Group A served as the normal control group, where rats were neither induced nor treated. Group B acted

as the negative control group, where rats were induced but not treated. Group C served as the positive control group, where rats were induced and treated with glibenclamide. Groups D - F consisted of rats that were induced and treated with 100, 200 and 400 mg/kg b.w of DTSE respectively. The level of glucose in the blood was determined prior to induction of diabetes with alloxan, and for 21 days following. Alloxan-induced diabetic rats treated with DTSE showed a relative significant ($p<0.05$) reduction in blood sugar levels when compared with the controls. The results also showed a significant decrease in the concentrations of cholesterol and LDL-C when compared to the control while, TAG and VLDL-C showed a significant increase in concentration when compared to the control. Also the kidney histology results showed mild degeneration of the renal tubular epithelium (black arrows) and renal tubular epithelium in the group treated with 400mg/kg/b.w of DTSE. The study suggests that DTSE conferred a hypoglycemic and anti-lipidemic effect on alloxan-induced diabetic rats. Thus, DTSE can be a potential lead to the development of drug candidates for the associated conditions but could pose a danger in the kidney of the rats when treated with high dose.

Keywords: Diabetes, Histology, *Dennettia tripetala,* Glibenclamide, Rats.

NSBMB/UPH/MB/027

Changes In Oxidative Stress Biomarkers In Wistar Albino Rats Due To The Oral Administration Of Aqueous Stem Extract Of *Cissus populnea*

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ABSTRACT

Cissus populnea is a plant with evidences of ethnomedicinal uses. However, a dearth of information exists on changes in oxidative stress parameters due to chronic administration of the aqueous stem extract of the plant. The present study evaluates changes in oxidative stress parameters in both male and female *Wistar* albino rats due to oral administration of the aqueous stem extract. Forty animals (20 males and 20 females), 8 groups (n=5) (4 males, 4 females) given daily oral doses (125mg/kg, 250mg/kg and 500mg/kg bod) of the extract for 28 days were used. The control groups received distilled water. All animals were sacrificed on Day 29. Tissues from liver, heart, kidney, lungs, testes (males) and ovaries (females) of the animals were used for the determination of malondialdehyde, reduced glutathione and the activities of catalase and superoxide dismutase. In the males, the extract led to a significant ($p> 0.05$) reduction in the hepatic malondialdehyde while the level in other organs remained unaltered ($p> 0.05$). In the females, administration of 500 mg/kg of extract led to a significant ($p> 0.05$) increase in both hepatic and renal malondialdehyde levels, but a significant ($p> 0.05$) reduction in the cardiac malondialdehyde level, malondialdehyde level remained unchanged ($p> 0.05$) in other organs. Though, the extract caused changes ($p> 0.05$) in glutathione and activities of catalase and superoxide dismutase in some of the organs, malondialdehyde was not affected at

doses below 500 mg/kg. Thus, the extract did not cause oxidative stress in the animals at low doses.

KEYWORDS: Oxidative stress, *Cissus populnea,* malondialdehyde, catalase, superoxide dismutase, glutathione.

NSBMB/UPH/MB/028

Serum Lipid Profile And Waist/Hip Ratio Among Adolescents Residing In Ungogo Local Government Area, Kano State

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ABSTRACT

There has been rising burden of childhood and adolescent's obesity in most developing countries despite high prevalence of under-nutrition. The aim of this study was to determine Serum Lipid Profile and Waist/Hip Ratio Among Adolescents Residing in Ungogo Local Government Area, Kano State. A cross–sectional analytical study was undertaken among adolescents aged between 13-19 years who were selected using multi-stage sampling technique. Serum Lipid Profile Concentrations were estimated using enzymatic Spectro-photometric methods while waist/hip ratio (WHR) was calculated as Waist Circumference (cm)/Hip Circumference (cm). Total Cholesterol, Triglyceride and High Density Lipoprotein were found to be higher when compared with the corresponding baseline (150-200 mg/dL, 30-150 mg/dL, 40-60 mg/dL) respectively. Waist Hip Ratio were found to be higher when compared with the corresponding baseline Normal (0.44-0.52), Extremely slim (≤0.34), Underweight (0.35-0.43), Overweight/Obese (≥0.52). Total Cholesterol and Triglyceride were significantly ($P<0.05$) associated with Waist and Hip Circumference. Total Cholesterol and Triglyceride were positively correlated with Waist and Hip Circumference in the studied area ($P<0.05$). Subjects with high Waist and Hip Circumference showed significant association with Serum Lipid Profile. There was positive correlation between Waist and Hip Circumference and Serum Lipid Profile. The study shows that Abnormal Lipid Profile and Overweight/Obese is present among the studied subjects.

Keywords: Waist Hip Ratio, Total Cholesterol, Triglyceride, High Density Lipoprotein

NSBMB/UPH/MB/029

Phytochemical Studies and Effects of Aqueous Leaf Extract of *Anacardium occidentale* on Alloxan-Induced Diabetic Male Albino Rats

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ABSTRACT

This study was carried out to investigate the phytochemical components of aqueous leaf extract of *Anacardium occidentale* and the effects of aqueous leaf extract of *Anacardium occidentale* on alloxan induced diabetic male albino rats. GCMS analysis of Anarcadium occidentale aqueous leaf extract revealed the presence of many bioactive compounds including gamma.-Terpinene, Securinine, Methyldiallylamine, 1,2,3-Benzenetriol, 9-Octadecene, 5,9-Undecadien-2-one, 6,10-Dimethyl, dl-.alpha.-Tocopherol, Methyltris (trimethylsiloxy) silane, Acetamide, N-[4-(trimethylsilyl)phenyl with high percentage content. These compounds contribute to the plants medicinal importance as antidiabetic, antibacterial, antimicrobial, antioxidant, antifungal, anti-inflamatory, anticancer activities. Diabetes mellitus (DM) was induced to 90g-120g rats via intraperitoneal injection of freshly prepared alloxan monohydrate solution at a dose of 120 mg/kg body weight (bwt). The treatment group was then administered orally with aqueous leaf extract of *Anacardium occidentale* at 100 mg/kg for 28 days, after which the blood glucose, liver function, lipid profile, renal function and antioxidants levels were determined and compared with the normal control. The result showed that treatment of diabetic rats with aqueous extract of *Anacardium occidentale* leaves significantly increased their body weights ($p < 0.05$), but there were no significant differences in the relative weights of kidney and pancreas among the groups. The result also showed significant reductions in their FBG levels, as well as activities of ALT, AST and ALP ($p < 0.05$). The aqueous plant extract also significantly reduced the circulating levels of triacylglycerol (TG), total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C), but significantly increased high-density lipoprotein cholesterol (HDL-C) ($p < 0.05$). These results suggest that aqueous extract of *Anacardium occidentale* leaves mitigates diabetogenic action of alloxan in albino rats.

Keyword: *Anacardium occidentale*, Antidiabetic activity, Alloxan-induced diabetes, phytochemical components, Lipid profile.

NSBMB/UPH/MB/030

THE EFFECT OF ETHANOL LEAF EXTRACT OF CABBAGE *(Brassica oleraceae)* ON THE LIPID PROFILE OF ALBINO RAT

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ABSTRACT

Cabbage is traditionally used for medicinal purposes like the treatment of various types of cancer, headaches, diarrhea, gout, peptic ulcers, as well as for detoxifying the body. The activity of the plant against dyslipidemia, calls for examination. Sixteen (16) Wistar albino rats of 100–150 g were grouped into four groups (1, 2 3, and 4) containing 4 rats per group. Group 3 and 4 were administered cabbage extract by oral intubation at 100mg/kg/bw and 300 mg/kg/bw doses respectively for a week (7 days) with the corresponding doses of prednisolone drug 100mg/kg/bw administered to group 2 while animals in group 1 served as the control were given normal feed and water. The serum levels (mg/dl) of Total cholesterol, LDL-Cholesterol, HDL-Cholesterol and Triglycerol were determined spectrophotometrically. Trig (191mg/dl), LDL (183 mg/dl) and HDL (114 mg/dl) levels were significantly increased in group 2 as compared to group 1(Tchol (292 mg/dl), Trig (143 mg/dl), LDL (152 mg/dl) and HDL (82 mg/dl)) indicating an increased in the lipid level. Group 3 showed a significant decrease in the level of Tchol (171 mg/dl), Trig (112 mg/dl), LDL (129 mg/dl) and HDL (74 mg/dl) compared

to group 2. Group 3 further showed a significant decrease in T-cholesterol (149 mg/dl), LDL (88 mg/dl) and HDL (47 mg/dl) levels. The results showed that the leaf extract of Cabbage (*Brassica oleraceae*) was effective on the prednisolone induced Obesity (Hyperlipidemia), thereby reducing the levels of Total cholesterol, Triglycerol, Low Density Lipoprotein, High Density Lipoprotein. Therefore, cabbage leaf can be used for the purpose of reducing dyslipidemia.

Keywords: Cabbage, Lipid, Prednisolone, Rats

NSBMB/UPH/MB/031

Anti-Asthmatic Potentials Of *Allium Sativum* Bulbs And *Zingiber Officinale* Rhyzomes In Experimentally-Induced Asthma

Anna IYAJI, Lawrence U EZEANYIKA, Chioma Assumpta ANOSIKE, Uzochukwu Gospel UKACHUKWU

ABSTRACT

The aim of this research was to investigate the anti-asthmatic effects of aqueous extracts of *Allium sativum* and *Zingiber officinale* in an experimental model of asthma. Forty-eight Wistar rats of average body weights ranging between 148 g – 374 g were grouped into eight of six animals each. Group 1 served as normal control. Rats were sensitized with intraperitoneal (i.p) injection of ovalbumin (OVA) (1 mg/kg) along with aluminium hydroxide (200 mg in 1 ml of saline) and lipopolysaccharide (LPS) (20 ug/kg i.p) on days 0 and 7. One week later, rats in groups 2-8 were challenged with 0.5% w/v each of OVA and LPS aerosol in saline on days 14 onwards for 20 minutes per day for 14 days. Group 2 were given no treatment, but groups 3-8 were administered 250 mg/b.w *A. sativum*, 500 mg/b.w *A. sativum*, 250 mg/kg b.w *Z. officinale*, 500 mg/kg b.w *Z. officinale*, 250 mg/b.w each of *A. sativum* + *Z. officinale* and 500 mg/b.w each of *A. sativum* + *Z. officinale*, respectively. Administrations of *A. sativum and Z. officinale* extracts showed a significant ($p < 0.05$) decrease in the levels of neutrophils, eosinophils and white blood cells relative to the untreated group (group 2). There was a dose dependent significant ($p < 0.05$) decrease in the concentrations of alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), total and direct bilirubin for the two extracts in the treatment groups compared to group 2 (untreated). The levels of IL-4, IL-5, IL-13 and IgE of the treatment groups were all found to be significantly ($p < 0.05$) reduced when compared to the positive control (group 2). Administration of *A. sativum and Z. officinale* led to significant ($p < 0.05$) decline in MDA concentration, with corresponding elevation in the activities of SOD and CAT, as well as GSH concentration when compared to asthmatic (untreated) group. Findings from this study showed that fermented *A. sativum and Zingiber officinale* extracts possess anti-asthmatic potential.

Keywords: *Allium sativum, Zingiber officinale,* anti-asthmatic, ovalbumin, lipopolysaccharide, inflammatory cytokines

NSBMB/UPH/MB/032

Comparative Diabetes Risk Assessment Using Two Validated Diabetes Risk Scoring Tools

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ABSTRACT

Diabetes mellitus has become a global health concern. Individuals at risk of the disease can be identified by diabetes risk scoring tools such as the American Diabetes Association Risk Tool (ADART) and Australian Diabetes Risk (AUSDRISK) tool. This study was aimed at comparing the diabetes risk status among undergraduates in a Nigerian University using two risk assessment tools. The study involved 223 participants (male and female) drawn from Michael Okpara University of Agriculture, Umudike, Nigeria. They were subjected to anthropometric measurements following standard protocol while diabetes risk scoring was done using the ADART and AUSDRISK tool. Majority of the participants (69.1%) were in the lower age group of 15-23 years. More females (57.8%) relative to males (42.2%) participated in the study. Pre-hypertension and hypertension were found in 17.9% and 21.5% of the study population, respectively. Whereas 41.3% of the study participants were found to be physically inactive, a family history of diabetes was found in 26.9% of the participants. Overweight and obesity was found in 17.3% and 5.4% of the population, respectively with a preponderance of males (7.4% *vs* 3.9%) relative to females attaining the obesity threshold. Risk screening using ADART showed that 49.8% (66.0% in males *vs* 38.0% in females) of the study population had a high risk of developing diabetes. Risk screening using AUSDRISK tool showed that 24.2% (31.9% in males *vs* 18.6% in females) had intermediate risk while 2.2 (2.1% in males *vs* 2.2% in females) had a high risk of developing diabetes in the study population. There is need for urgent lifestyle changes in this population in order to stem the tide of increasing prevalence of diabetes mellitus. The validation of the diagnostic accuracy of the risk assessment tools in this population is recommended in future studies.

KEYWORDS: Diabetes mellitus; risk scoring; ADART; AUSDRISK; obesity

NSBMB/UPH/MB/033

Examination Of The Interplay Of Gut Microbiota And Host Metabolism: Implications For Health And Disease Prevention

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ABSTRACT

The interaction between gut microbiota and host metabolism is pivotal in regulating immune function, with dysbiosis linked to various diseases such as metabolic disorders and inflammatory conditions. This study is an examination of the molecular communication between gut microbiota and host metabolism, highlighting recent discoveries and emerging ideas in the field. The impact of gut microbial metabolites like short-chain fatty acids, bile acids, and secondary metabolites on host physiology and disease susceptibility are thoroughly

explored. Additionally, to carry out the study, the mechanisms underlying microbiota-host interactions, including microbial signaling pathways, host-microbiota crosstalk, and immune modulation, are investigated. The examination of the interplay holds significant promise for developing innovative therapies that target the microbiome to enhance health and prevent disease. This research aims to discover the potential of manipulating the gut microbiota to enhance metabolic health and mitigate the risk of metabolic and inflammatory disorders, paving the way for personalized approaches to disease prevention and treatment.

Key words: Gut Microbiota, Host Metabolism, Immune Modulation, Microbial Metabolites, Therapeutic Interventions.

NSBMB/UPH/MB/034

Antioxidant And Hematological Effects Of *Curcuma Longa* And *Mentha Piperita* In Albino Rats

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ABSTRACT

This study was done to determine the antioxidants and hematological effects of C*urcuma longa* (Tumeric) and *Mentha piperita* (pepper mint), when taken in single and combined forms. Forty-two (42) wistar rats of mixed gender, excluding pregnant animals where used for the experiment which lasted for 6 weeks. Animals were divided into seven (7) groups. Group A (Normal Control group), were fed with commercial rat pellets. The experimental groups comprised of Group B, which were fed with commercial rat pellets mixed with 2.5% turmeric, Group C, were fed commercial rat pellets mixed with 10% turmeric, Group D, were fed commercial rat pellets mixed with 2.5% mint leaves, Group E, were fed commercial rat pellets mixed with 10% mint leaves, Group F, were fed commercial rat pellets and a mixture of 2.5% (1:1) of *Curcuma longa* and *Mentha piperita* and Group G, were fed commercial rat pellets and a mixture of 10% (1:1) of *Curcuma longa* and *Mentha piperita.* The antioxidant and hematological parameters were determined using standard procedures. The results showed that the control group had a non-significantly higher SOD activity ($p>0.05$) than the experimental groups. All the experimental groups had a significantly lower Catalase activity ($p<0.05$), except the 10% mixture (group G) that had significantly higher catalase activity ($p<0.05$), compared to the control group. There was a non-significant lower MDA level in most of the experimental groups. The hematological tests showed, that there was no significant increase in WBC level in all the experimental groups compared to the control ($p>0.05$), though the 10% mixture had a higher WBC level. There was a significantly reduced hemoglobin count, hematocrit and RBC count in most of the experimental groups when compared to the control. There was also a non-significant non-concentration dependent increase in platelet count in most of the experimental groups especially group G (10% mixture of both plants).

NSBMB/UPH/MB/035

Methanol Leaf Extract Of *Azanza Garckeana* Reduced Blood Sugar Levels And Improved Antioxidant Status In Wistar Rats

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ABSTRACT

Diabetes mellitus is a chronic disease characterized by an absolute or relative deficiency of insulin. Different plant materials have been shown over the years to have positive effects in the management of diabetes. A unique plant indigenous to Tula people in Gombe state Nigeria have been used traditionally over the years to manage diabetes. Leaf extract of the plant is believed to have blood sugar lowering activity. Scientific evidence to support this assertion is limited. It is on this premise that this study was done to ascertain the blood sugar lowering and antioxidant activity. Four doses (150 mg/kg, 300 mg/kg, 600 mg/kg and 1200 mg/kg) of the extract were administered to normal rats along with control group for 28 days. Fasting blood sugar levels were recorded on days 0, 14 and 28. Levels and activity of GSH, SOD and GST were determined in pancreatic tissues. Results showed a dose dependent decrease in blood sugar levels with increase in dose of extract. The observation was the same for GSH, SOD and GST. At all the doses, the effect was significant when compared to the control ($p < 0.05$). This findings agrees with the traditional use of the plant to treat diabetes. Further studies are recommended to identify and characterize the compound (s) responsible for the observable activity.

Keyword: *Azanza garckeana*, Antioxidants, fasting blood sugar, Oxidative stress, Pancreas.

NSBMB/UPH/MB/036

Serological And Molecular Identification Of Mumps Virus Among Children In Informal Settings In Jalingo Local Government Area Of Taraba State

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ABSTRACT

In this study, Sero-prevalence of mumps virus IgG and IgM antibodies and molecular identification was determined from participants selected from informal settings in Jalingo local government area of Taraba State. The objectives of this study were to detect the presence of mumps virus specific antibodies in the serum of children (6 -18yrs), to determine the association of socioeconomic background of the children with the Mumps prevalence and to identify the mumps viral SH gene from the subjects investigated. Questionnaire was administered to extract demographic data from the participant, which include, age, gender, socioeconomic background, vaccination history. A total number of 138 samples were collected using random systematic sampling, tested and analysed for statistical relationship. The participants were divided into three groups based on their socioeconomic background. They were also grouped into vaccinated and non-vaccinated group based on their vaccination history. ELISA test kit was used in determining the sero-prevalence of the mumps virus IgG and IgM antibodies among the subjects investigated. HotStart PCR kit was then used to determine the presence of the mumps virus SH gene from the participants positive for mumps virus IgG and IgM antibodies. A total number of 37 participants were positive for mumps virus IgG and IgM antibodies. 12 out of the 37 positive participants were vaccinated against mumps virus disease

and 25 were not vaccinated. low income earners recorded highest percentage of participants with mumps virus antibodies while the high income earners group recorded the least group with the lowest percentage of participants positive for mumps virus antibodies. The mumps virus SH gene was only detected in non-vaccinated group with molecular weight between 100 and 200 base pairs in each sample lane of the agarose electrophoresis. Male participants recorded highest prevalence of mumps virus antibodies as compared to the female. There was statistical significant relationship between the sero-prevalence of the mumps virus and the socioeconomic status of the participants ($p > 0.05$). Mumps virus sero-positivity increase with decrease in socio-economic status. Vaccine-induced antibodies contributed in the Sero-positivity of the mumps virus antibodies in the samples of the participants investigated.

Key words: Mumps virus, Sero-prevalence, ELISA, IgG and IgM antibodies, PCR, Socioeconomic background

NSBMB/UPH/MB/037

Comparative Phytochemicals And Response Of Ethanolic Extract Of *Moringa Oleifera* Leaf And Aboreal Portion Of *Nelsonia Canescens* To Total Dehydrogenase Activity Of Selected Bacterial Isolates

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ABSTRACT

The present study investigated the comparative phytochemicals and effect of ethanolic extract of *M. oleifera* leaf and aboreal portion of *N. canescens* to total dehydrogenase activity of selected bacterial Isolates. The response of the extracts to total dehydrogenase activity of the isolates was studied using thiazolyl blue tetrazolium bromide (TBTB) as the electron acceptor. The assay consisted of varying concentrations of the *M. Oleifera* and *N. canescens* extracts corresponding to concentrations of 0-3000 µg/ml, 400% nutrient broth, sterile water, bacterial suspensions and 0.1% TBTB in a final volume of 1.0ml placed in triplicate screw capped glass test tubes. The inhibitions of total dehydrogenase activity of isolates was determined by measuring the optical density (λmax =570nm) of formazan produced after 24hrs incubation at 37 °C and % inhibition was calculated relative to control. Ciprofloxacin was used as reference standard and treated same as extracts and control. Qualitative phytochemical screening of *M. oleifera* and *N.* canescens ethanol extracts indicate the presence of phenolics, flavonoids, tannins, saponins and alkaloids. Other results obtained from the study showed that the threshold inhibitory concentration (IC_{50}) of *M. Oleifera* extracts was 80.69 ± 7.86 *µg*/ml, 437.44 ± 51.28 *µg*/ml, and 303.64 ± 26.45 *µg*/ml, *N. canescens* extracts was 520.72 ± 35.77 *µg*/ml, 209.94 ± 22.55 *µg*/ml and 337.02 ± 13.67 *µg*/ml; while ciprofloxacin was 25.40 ± 2.12 *µg*/ml, 29.21 ± 1.42 *µg*/ml, and 79.25 ± 6.20 *µg*/ml against *S. aureus, E. coli and S. typhimurium* total dehydrogenase activity respectively. The inhibitory response of the extract to *S. aureus* and *S. typhimurium* total dehydrogenase activity was in the order Ciprofroxacin > *M. oleifera* > *N. canescens*, and Ciprofroxacin > *N. canescens* > *M. oleifera* for *E. coli*. The extracts

significantly ($p<0.05$) inhibited the isolates total dehydrogenase activity and may be a source of antimicrobial agents for treatment of related infections.

Keywords: *Moringa oleifera, Nelsonia canescens, phytochemicals, dehydrogenases, antimicrobial*

NSBMB/UPH/MB/038

Antioxidant Capacity Of Methanol Extract Of *Gymnema Sylvestre* Leaves And Its Effect On Some Physical And Biochemical Parameters Of Potassium Bromate Treated Rats

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ABSTRACT

This study investigated the antioxidant capacity of methanol extract of *Gymnema sylvestre* (gurmar) leaves and its effect on some physical and biochemical parameters of potassium bromate -treated rats. Of the six (6)groups, group 1: control rats, group 2: rats administered methanol extract of gurmar leaves (200 mg / kg bwt), group 3: rats administered extract of gurmar leaves (500 mg / kg bwt), group 4: ($KBrO_3$) - treated rats (20 mg / kg, bwt), group 5: rats treated with $KBrO_3$ (20 mg / kg bwt) and extract of gurmar leaves (200 mg / kg bwt) and group 6: rats treated with $KBrO_3$ (20 mg / kg bwt) and extract of gurmar leaves (500 mg /kg bwt). Antioxidant activity of gurmar was carried out using Ferric Reducing Power and 2, 2-Diphenyl-1-picrylhydrazyl methods. Organ weights and percentage weight gain were determined via analytical methods. Serum electrolyte concentrations of K^+, Na^+ and Cl^- were determined using an automatic electrolyte analyzer. Methanol extracts of gurmar leaves exhibited antioxidant activity against free radicals. There was a significant decrease ($p<0.05$) in the weight of liver and increase in weight of kidney of rats in $KBrO_3$ treated group when compared with the control group. There was also significant increase in the serum electrolyte concentration of rats in $KBrO_3$ treated group. However, this was reversed when methanol extracts of gurmar was co-administered with $KBrO_3$. The results of this study suggest that the methanol extract of the leaves of gurmar has the potential to ameliorate $KBrO_3$ induced toxicity.

Key words: Potassium bromate, toxicity, *Gymnema sylvestre,* antioxidant, ameliorate and extract.

NSBMB/UPH/MB/039

PHYTOCHEMICAL AND PROXIMATE COMPOSITION OF SESAME (*Sesamum indicum*) SEEDS CONSUMED IN NSUKKA, ENUGU STATE, NIGERIA

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ABSTRACT

Sesame seeds are consumable seed that are found and grown in pods, its fruits are pubscent capsule with a short triangular back. Phytochemical analysis was carried out using the Harborne (1973) methods, while proximate analysis was carried out using the Association of Official Analytical Chemist (A.O.A.C). Sesame is mainly cultivated in the northern part of Nigeria. However, successful harvest have been carried out in some part of southern states including Nsukka, Enugu State. This research was carried out to determine the effect of change in soil and climatic condition on the nutritional contents of sesame. Phytochemical chemical results shows the presence of saponin (5.60mg/100g), Tannin (3.87mg/100g), Flavonoids (18.03mg/100g), Alkaloids (4.80mg/100g), and Phenols (13.83mg/100g). The proximate analysis indicated that sesame contained 28.37% carbohydrate, 7.37% moisture, 23.32% protein, 26.63% fat/oil, 10.28% crude fibre, and 4.02% ash. The statistical analysis shows that carbohydrate, Fat/Oil and protein occur in significant amounts, which shows an indication that sesame seeds possess a high nutritional values. Also, there is a significant values shown in some of the phytochemical like phenol and flavonoids. This implies that sesame seeds are rich with antioxidant and other medicinal properties. Daily consumption of *Sesamum indicum* seeds is recommended as part of our dietary intake due to its high nutritional and medicinal properties.

Keywords: Flavonoids, Protein, Tannins, Phenol, Moisture, Fat/Oil, Antioxidant

NSBMB/UPH/MB/040

Role Of Epigenetic Factors In The Development Of Obesity And Type 2 Diabetes Mellitus

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ABSTRACT

Epigenetic factors are increasingly recognized as pivotal contributors to the development of obesity and type 2 diabetes mellitus (T2DM). This review provides an overview of the epigenetic mechanisms, including DNA methylation, histone modifications, and RNA-mediated processes, influencing the pathogenesis of these metabolic disorders. Examining epigenetic signatures in adipose tissue, skeletal muscle, pancreatic islets, liver, and blood, we identify key genes and pathways associated with obesity and T2DM. Dysregulation of DNA methylation patterns, particularly involving genes such as CAPT1A, LEP, INSIGF, NDUFB61, FASN, IRS1, and GNAS, contributes to metabolic dysfunction and inflammation in obesity. Similarly, alterations in histone modifications, particularly H3K4, impact insulin signaling and glucose metabolism. In T2DM, aberrant DNA methylation at genes including PDX1, TCF7L2, PPARGC1A, PAX4, IRS, and GLPIR disrupts insulin secretion and glucose homeostasis. Histone modifications, such as acetylation and methylation, further regulate gene expression in pancreatic β-cells in response to glucose levels. Understanding the intricate interplay between epigenetic modifications, genetic predisposition, and environmental factors holds promise for developing targeted therapies for obesity and T2DM. Additionally, the reversible nature of epigenetic alterations opens avenues for innovative therapeutic strategies to combat these prevalent metabolic disorders.

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Evaluation Of Anti-Inflammatory, Anti-Pyretic And Analgesic Properties Of Aqueous Leaf Extract Of *Luffa Cylindrica* (Awele-Olise) On Wistar Rats

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ABSTRACT

Anti-inflammatory, anti-pyretic and analgesic effects of aqueous leaf extract of *Luffa cylindrica* on Wistar rats were investigated. Twenty (20) Wistar rats of both sexes weighing between 140-175 g were divided into 5 groups of 4 rats. A total of 60 rats were used for the anti-inflammatory, anti-pyretic and analgesic investigation. Inflammation, hyperthermia and pain were induced using 0.2 percent egg albumin, 0.4 percent baker's yeast and one percent acetic acid respectively. There was a significant reduction ($p \geq 0.05$) in paw oedema after 4 hours in groups 3 (800 mg/kg) and 4(1600 mg/kg b.w). In the same vein, a significant reduction ($p \leq 0.05$) in interleukin-6 and C-reactive protein concentration in groups 3 and 4 in comparison to group 2 (negative control) was observed. A significant decrease ($p \leq 0.05$) in neutrophils in group 3, a non-significant reduction ($p \geq 0.05$) in monocytes in group 4 when compared with group 2, important reduction ($p \leq 0.05$) in rectal temperature after 4 hours in group 3, non-significant reduction ($p \geq 0.05$) in rectal temperature after 4 hours in group 4 in comparison with group 2, non-significant reduction ($p \geq 0.05$) in writhing were seen in animals in groups 3 and 4 in comparison with group 2. *Luffa cylindrica* leaf extract at 1600 mg/kg b.w exhibited higher percentage inhibition (33.33%). Through the study findings, it is concluded that aqueous leaf extract of *Luffa cylindrica* at 800 and 1600 mg/kg possesses anti-inflammatory and antipyretic properties with mild analgesic effect in Wistar rats.

Keywords: Anti-inflammatory, anti-pyretic, analgesic, monocytes, neutrophils

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Effects Of Carbamazepine On Ionoregulatory Disruption And Lipid Profile Of Epileptics In Ogun State, Nigeria

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ABSTRACT

Epilepsy is a neurological disorder associated with electrolyte and lipid profile alteration. Carbamazepine (CBZ), has been widely used as a first line drug in the treatment of epilepsy. However, its modulation on electrolyte imbalance is yet to be explored. This study evaluated the effects of carbamazepine on electrolytes and lipid profile in epileptics. Epileptics (100) having different seizure types with age ranges 18 – 50 years were recruited from Out-Patient

Clinic (OPC) in Neuropsychiatric Hospital, Aro, Abeokuta, Nigeria and sex matched control (n = 100) from Federal University of Agriculture, Abeokuta were used. The epileptics were on carbamazepine for at least six months. Electrolytes Sodium (Na+), Potassium (K+), Magnesium (Mg2+), Calcium (Ca2+) and Chloride (Cl-) with Cholesterol, Triacyglycerol and Phospholipid level were determined in plasma and erythrocyte. All parameters were determined using spectrophotometric method. Data were analyzed using analysis of variance. In this study, generalized epilepsy was found to be the commonest type of epilepsy with 53%. Sixty–three percent (63%) of the entire population are male subjects. Sodium level decrease significantly ($p>0.05$) in female with epilepsy based on gender. There was a significant decrease in the mean value of magnesium in female with focal epilepsy 1.29 ± 2.55 mg/dl when compared with the control with mean value of 1.78 ± 1.4 mg/dl. Based on gender, hypocholesterolemia and hypotriglycerolemia were observed in the epileptics. Hypophospholipidemia was observed in all epileptic groups compared to control. In conclusion, carbamazepine therapy for at least six months could not manage sodium homeostasis in the female epileptics and hypolipidemia in epileptics.

Keywords: Epilepsy, Carbamazepine, Lipid profile, Electrolytes.

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Uterine Contractility, Biomarkers Of Postpartum Haemorrhage And Reproductive Hormones In Pregnant Wistar Rats Administered *Ocimum basilicum* Leaf And *Curcuma longa* Rhizome Extracts

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ABSTRACT

The study evaluated the *in vitro* uterine contractility of *Ocimum basilicum* (OB) leaf and *Curcuma longa* (CL) rhizome extracts and their effect on biomarkers of postpartum heamorrhage (phosphatidylinositol and phophatidylserine) and reproductive hormones in pregnant Wistar rat. Rat uterus was isolated and suspended in an organbath, varying concentrations of OB and CL extract were applied singly and in combination and the resultant muscle contractility measure. Forty-five female rats (40 pregnant and 5 non-pregnant) were divided into 9 groups of 5 animals each. Group 1 and 2 served as non-pregnant and pregnant control groups while Group 3 received therapeutic dose of misoprostol, a standard uterotonic drug. Groups 4 and 5 were administered 500mg/kg and 1000mg/kg of OB extract respectively while Groups 6 and 7 received 500mg/kg and 1000mg/kg of CL extract respectively. Combined 250mg/kg of OB and 250mg/kg of CL extracts was administered to Group 8 while Group 9 received combined 500mg/kg of OB and 500mg/kg of CL extracts. All administration was given orally for 7 days (the third trimester of pregnancy). The extracts of OB and CL demonstrated significant *in vitro* uterine contractile activity. Maximum contractile activity of *Curcuma longa* was comparable to that of misoprostol but achieved within a shorter period of 12 seconds compared to 27 seconds by misoprostol. The extracts of OB and CL, singly and in combination, significantly increased ($p<0.05$) phosphatidylinositol and phosphatidylserine concentrations compared to the control. Estradiol and oxytocin were significantly increased by *O. basilicum* extract and in combination with *C. longa* compared to the pregnant control group.

1000 mg/kg of the extracts significantly decreased the concentration of LH in comparison to the pregnant control group. The study has demonstrated that the extracts of *Ocimum basilicum* leaf and *Curcuma longa* rhizome possess uterotonic activity and positively modulate biomarkers of postpartum haemorrhage and reproductive hormones in pregnant Wistar rats.

Keywords: *Ocimum basilicum*, *Curcuma longa*, uterine contraction, postpartum haemorrhage, reproductive hormones

NSBMB/UPH/MB/044

Comparative Wound Healing Potential Of *Mitracarpus Hirtus* Ointment And Honey In Diabetic Albino Rats By Collagen Assessment

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ABSTRACT

Comparative wound healing potential of *Mitracarpus hirtus* ointment and honey in diabetic albino rats by collagen assessment. Biofarmasi J Nat Prod Biochem 19: 39-44. All humans will experience some type of wound in every lifetime. Most wounds heal quickly with little or no attention, but many people suffer from complex and/or persistent wounds, therefore posing a burden. This study was designed to assess the efficacy of *Mitracarpus hirtus* (L.) DC ointment against honey in diabetic rats. To achieve this, percentage wound closure and collagen assessments were used to express treatment efficacy. Results show that on day 21, rats treated with *M. hirtus* ointment had the highest percentage closure (94.5%) while honey treated and non-treated recorded 90.0% and 83.3% respectively. Similarly, a significant difference ($p < 0.05$) was observed on day 21 in the total collagen deposited in wounds of diabetic rats (10.57 ± 0.7) and *M. hirtus* ointment treated wounds (11.77 ± 0.4) as compared with the non-treated diabetic rats. *M. hirtus* ointment was efficacious in healing wounds in diabetic rats and heals wound faster than honey and may hold potential for wound healing in diabetes mellitus sufferers. However, the wound healing mechanism of this ointment needs further investigation.

Keyword: Collagen, diabetic rats, honey, *Mitracarpus hirtus*, ointment, wound healing

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Exploring The Relationship Between Ferroptosis And Apoptosis In Breast Cancer Cells

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ABSTRACT

Ferroptosis is an iron-dependent form of cell death that is distinct from apoptosis, necrosis, and autophagy. Erastin is an inducer of ferroptosis which prevents cystine uptake through the *SLC7A11/GPX4/PLOOH* axis by inhibiting Soluble Carrier Family 7 member 11 (*SLC7A11*). Although ferroptosis induces cell death using a different mechanism, we asked whether ferroptosis affect signatures of apoptosis. This led us to performed cell viability assay and quantitative-real time PCR (qRT-PCR) in breast cancer cells. Erastin was used to induce ferroptosis in breast cancer cells, and our results showed remarkable changes in the morphology of Erastin treated cells compared to cells treated with vehicle. The half-maximal inhibitory concentration (IC50) of 32.4 µM was obtained from cell viability after 24 h of treatment with Erastin. Erastin treated cells showed significant downregulation of ferroptotic genes (*SLC7A11*, glutamate-cysteine ligase catalytic subunit - *GCLC*) and apoptotic gene (*BCL2*), while *p21* an apoptotic gene is significantly upregulated. Conclusively, our results suggest there is an interaction between ferroptosis and apoptosis in breast cancer, and this may be explored for potential therapeutic interventions.

Key words: Ferroptosis, apoptosis, breast cancer, erastin, *SLC7A11*,

NSBMB/UPH/MB/046

Detection Of Genetic Markers Associated With *Plasmodium Falciparum* Drug Resistance Among Malaria Patients In Kaduna State, Nigeria

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ABSTRACT

Malaria is a disease of public health concern in Nigeria and sub-Saharan Africa. It is caused by intracellular parasites of the genus *Plasmodium*. The aim of this study was to detect genetic markers associated with *Plasmodium falciparum* drug resistance among malaria patients in Kaduna State, Nigeria. The study was a cross-sectional study that lasted for five months. Three hundred blood samples were collected from consenting individuals attending selected hospitals, in the three senatorial districts of Kaduna State, Nigeria. Structured questionnaires were used to obtain relevant data from study participants. The blood samples were screened for malaria parasites using microscopy and rapid diagnostic test kit. Polymerase Chain Reaction was used for detection of the drug resistance genes. *Pfcrt, pfmdr1, pfdhfr, pfdhps* and *pfatpase6* genes were detected at expected amplicon sizes from the malaria positive samples. The *pfatpase6* PCR amplicons were sequenced and a phylogenetic tree was created to determine their relatedness. Result showed that *Pfcrt* (80%) had the highest prevalence, followed by *pfdhfr* (60%), *pfmdr1* (36%) and *pfdhps* (8%). *Pfatpase6* was also detected in 73.3% of the samples, and a phylogenetic tree showed relatedness between the *pfatpase6* sequences in this study and those deposited in the GenBank. In conclusion, genes associated with *Plasmodium falciparum* resistance to commonly used antimalarials were detected.

Keywords: Antimalarial, resistance, genes, amplicons

NSBMB/UPH/MB/047

Studies And Nephro-Protective Effect Of The Methanolic Seed Extract Of *Trigonella Foenum-Graecum L.* (Fenugreek) On Chlorpyriphos-Induced Wistar Strain Rat

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ABSTRACT

The aim of this research was to examine the potential kidney-protecting properties of methanolic seed extract obtained from Fenugreek (*Trigonella foenum-graecum* L.) and phytochemical activities of Chlopyriphos induced toxicity. Fresh Fenugreek seed were collected, processed, and subjected to methanol extraction using a Soxhlet extractor. Wistar Rats served as subjects in the experimental phase, with their serum creatinine and urea levels determined through Randox methods. The seeds extract underwent analysis to identify its qualitative and quantitative phytochemical composition. Results from acute toxicity tests showed no signs of toxicity or mortality, even at high doses of the seed extract. Phytochemical analysis revealed the presence of various bioactive compounds, including alkaloids, flavonoids, saponins, carbohydrates, phenols, steroids, and terpenoids. Quantitative analysis indicated tannins content at 2.24 mg/100g, alkaloids at 18%, flavonoids at 0.335 mgQE/g, phenolics at 94 mg/GAE/g, and ascorbic acid at 13.56 AE/g. Exposure to Chlorpyriphos led to kidney-related toxicity in rats, as evidenced by elevated levels of creatinine and urea in group three (3) 10.47 ± 0.19 mmol/L and 205.59 ± 23.44 mmol/L, respectively compared to the control group 5.06 ± 0.02 mmol/L and 83.16 ± 1.33 mmol/L respectively. Remarkably, when methanolic seeds extract of *T. foenum-graecum* L. was administered either alone or in combination with Chlorpyriphos, the increase in these levels was significantly reduced (for creatinine Extract + Chlorpyriphos at 100mg, 200mg and 400mg per kilogram body weight were 5.11 ± 0.18 mmol/L, 5.25 ± 0.13 mmol/L and 5.55 ± 0.56 mmol/L for group 4, 5, and 6 respectively. When extract was given alone at 100mg, 200mg and 400mg per kilogram body weight the results were 5.13 ± 0.09 mmol/L, 5.18 ± 0.05 mmol/L and 5.26 ± 0.04 mmol/L respectively for group 7, 8 and 9. And for urea levels, Extract + Chlorpyriphos 100mg, 200mg and 400mg per kilogram body weight, the results were 89.83 ± 4.13 mmol/L, 92.14 ± 5.59 mmol/L and 97.53 ± 6.79 mmol/L for group , 4,5 and 6 respectively. While when extract was given alone 100mg, 200mg and 400mg the results were 83.16 ± 1.33 mmol/L, 91.37 ± 5.63 mmol/L and 95.99 ± 6.89 mmol/L), suggesting a potential protective effect on kidney function.

Key words: *Trigonella foenum-graecum L., Chlopyriphos, Phytochemical, Urea, Creatinine.*

NSBMB/UPH/MB/048

Evaluation Of The Influences Of Essential Oil Derived From *Acanthus Montanus* Leaves On The Liver, Kidney, And Oxidative Stress Markers In Wistar Rats

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ABSTRACT

This research Evaluated the effect of essential oil derived from *Acanthus montanus* leaves on the liver, kidney, and oxidative stress markers in Wistar rats. The essential oil was extracted through hydro-distillation process using a Clevenger apparatus. Thirty-five (35) female Wistar rats aged 4-5 weeks weighing 160-200g were divided into seven groups of five rats each. Group A served as Control and was not exposed to any insecticide; B1, B2, and B3 were exposed to 300, 500, and 700mg/kg doses of essential oil while C1, C2, C3 were exposed to 300, 500, and 700mg/kg doses of Sniper insecticide, respectively. Animals were exposed to essential oil for 5 hours daily for 28 days. Different concentrations of oil were soaked in clean cotton wool introduced into the animal cages and put in a closed chamber with good ventilation. Throughout the experiment, animals were fed *ad libitum* with standard feed and drinking water. After twenty-eight days of exposure, they were sacrificed after an overnight fast with 0.25ml of ketamine injection as anesthesia. Blood samples were collected through cardiac puncture and analyzed for biochemical indices. Liver enzymes (AST, ALT, ALP), kidney function markers (urea and creatinine), antioxidant and oxidative stress markers (SOD, CAT, MDA) concentrations were determined using enzyme-linked immunosorbent assay (ELISA). The result showed that there were significant increases ($p<0.05$) in AST and ALT activities in rats exposed to sniper insecticide compared to the control group. However, there were no significant differences ($p>0.05$) in ALP activity in rats exposed to *Acanthus montanus* essential oil and the groups exposed to Sniper insecticide. Urea and Creatinine levels showed no significant difference ($p>0.05$) in the Sniper exposed groups and essential oil-exposed groups compared to the control group. Superoxide dismutase (SOD), catalase (CAT), and malondialdehyde (MDA**)** levels increased significantly ($p<0.05$) in rats exposed to Sniper insecticide compared to the control group.

Keywords: *Acanthus monthanus*, essential oil, biochemical indices, Wistar rats

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Preliminary Phytochemical Analysis And Evaluation Of The Chemosuppressive Antimalarial Effect Of Chloroform Soluble Fraction Of The Whole Plant Of *Centaurea Perrottetii* D.C (Asteraceae)

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ABSTRACT

In ethno-medicine, *Centaurea perrottetii* has been reportedly used to treat a range of ailments including malaria and fever. This study aimed at carrying out the preliminary phytochemical screening and evaluating the chemosuppressive antimalarial effect of the chloroform soluble fraction of the whole plant of *Centaurea perrottetii* D.C. Oral median lethal dose (LD_{50}) and phytochemical screening of the extract were carried out using Lorke's method and standard methods respectively. The antiplasmodial activity of the plant was carried using chloroquine-sensitive *Plasmodium berghei* in one rodent malaria models: Suppressive. Data were analyzed using one-way ANOVA followed by least significant difference (LSD) post-hoc test. The oral median lethal dose (LD_{50}) of the fraction was found to be > 5000 mg/kg. The fraction contained alkaloid, flavonoid, phenol, steroids, terpenoids and tannins. The extract at the doses tested (50,

150 and 250 mg/kg) produced significant ($p < 0.05$) dose dependent chemo-suppressive effect. The percentage parasite suppression was 96.67, 97.87 and 98.89 %, respectively. The results of this study showed that the chloroform soluble fraction of the whole plant of *Centaurea perrottetii* D.C. has significant antiplasmodial activity in mice, validating the traditional use of the plant in the management of malaria.

Keywords: Antiplasmodial, *Centaurea perrottetii*, Chloroform

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Anti-Oxidative Stress Capabilities Of Ethanolic Leaf-Extract Of *Cajanus Cajan* (*Linn*) Against Ethanol-Provoked Oxidative Stress In Wistar Rats

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ABSTRACT

Antioxidative stress capabilities of ethanolic leaf-extract of *Cajanus cajan (linn)* against ethanol-provoked oxidative stress in wistar rats were determined by examining the phytochemical and vitamin compositions, the levels of superoxide dismutase (SOD), catalase (CAT) and malondialdehyde (MDA). 30 wistar rats were completely randomized into 6 groups of A-F with each group having 5 rats. Group A was given normal saline only. Group B was given 5mg/kg body weight of Silymarin as standard drug; group C was given 3.7g/kg body weight of 99.7% ethanol only while rats in groups (D, E, F) were given graded doses of 200mg/Kg, 400mg/Kg and 600 mg/Kg body weights of the leaf-extract respectively. Groups B and (D, E, F) were given 3.7g/kg body weight of 99.7% ethanol, 3 hours later, Silymarin (standard drug) and leaf-extract were given respectively for 21 days. Oxidative stress indices, phytochemical and vitamin compositions and histopatological studies were carried out using standard procedures. SOD and CAT were significantly ($P<0.05$) decreased in positive control compared to the levels observed in standard and normal control groups while MDA level increased significantly ($P<0.05$) in positive control relative to other control groups. However, rat groups that received the leaf-extract of Cajanus cajan showed significant ($P<0.05$) reversal in the trend of these parameters to levels comparable to those observed in the standard and normal control groups. We therefore conclude that ethanol leaf-extracts of Cajanus cajan contains important phytochemical like flavonoids antioxidant vitamins (A, C and E) which could prevent alcohol-induced oxidative stress in wistar rats' liver.

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Molecular Studies Of Anti-Cancer Activities Of Methyl Stearate, Catechin, Kaempferol, Naringenin And 11-Octadecenoic Acid Methyl Ester From Hydromethanolic Extract Of *Hibiscus Sabdariffa* Seeds

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ABSTRACT

This study was aimed at assessing the anti-cancer activity of hydromethanol extract of *Hibiscus sabdariffa* seeds using molecular docking. *Hibiscus sabdariffa* seeds were thoroughly cleaned, ground into powder and subjected to extraction. Phytochemical and GC-MS analysis were carried out on the hydromethanol extract. Identified compounds from the extract were subjected to ADME (absorption, distribution, metabolism and excretion) properties' profiling using web-based tool, SwissADME. Five compounds with good ADME properties (methyl stearate, catechin, kaempferol, naringenin and 11-Octadecenoic acid, methyl ester) alongside known standards (doxorubicin and mitoxantrone) were selected for molecular docking against human topoisomerase I (hTOP-I) using PyRx and Biovia Discovery Studio software. From the result of the ADME profiling, the selected compounds were found to be highly soluble, had high human intestinal absorption capacity, lipophilic, and cannot pass the blood-brain barrier (BBB), demonstrating their good bioavailability. Furthermore, they had zero violations of the Lipinski's rule of five. From the docking result, catechin had the highest binding affinity (-8.2 Kcal/mol) to hTOP I followed by the one of the standards (doxorubicin), which had a binding affinity of -8.0 Kcal/mol. 11-Octadecenoic acid, methyl ester had the least binding affinity followed by methyl stearate (-4.9 Kcal/mol). Kaempferol (-8.3 Kcal/mol) had better binding affinity than mitoxantrone, which had a binding affinity of -6.7 Kcal/mol. This suggests that catechin, kaempferol, and naringenin showed strong anti-cancer effects by inhibiting hTOP-I, a key factor in cancer development. Hence, the positive pharmacokinetic properties and drug-likeness of these compounds can be utilized in the discovery of novel anti-cancer drugs.

Keywords: ADME profiling, Anti-cancer activity, *Hibiscus sabdariffa* seeds, Human topoisomerase I, Molecular docking.

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Anti-Ulcerative And Biochemical Effects Of Aqueous Extract Of Carica Papaya Pulp On Indomethacin-Induced Ulcerative Rats

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ABSTRACT

Carica papaya is a tropical and subtropical fruit plant recognized for its medicinal properties. Ulcer remains a significant health concern in many developing countries, including Nigeria. In this study, we investigated the effects of aqueous extract of Carica papaya pulp on male rats with indomethacin-induced ulcer and the bacteria, Helicobacter pylori from human stool. Thirty (30) healthy male wistar rats were randomly assigned into six (6) groups of five rats

each as follows; Group A, B, C, D, E, and F. Ulcer was induced using indomethacin in all the groups except Group A; Group B was left untreated; Group C was treated using a standard drug (Omeprazole); and different doses (100 mg/kg, 200 mg/kg, and 400 mg/kg) of the extract was administered orally to Groups D, E, and F respectively. The results of the in vitro analysis indicated that the bacteria (Helicobacter pylori) did not respond well to the extract showing less inhibition (11.20 mm) compared to the expected response (23.50 mm). From the results obtained, it was revealed that the aqueous extract of C. papaya pulp slightly exhibited an antiulcer activity in wistar albino rats although with reduced efficacy and potency. The administration of the extract showed significant increase in values of total bilirubin (p=0.027) while significant decline was observed in levels of AST(p=0.16), ALP(p=0.22), ALT(p=0.83) and direct bilirubin(p=0.70). The results showed no statistically significant difference in both the urea (p = 0.639) and creatinine (p=0.191) concentrations which suggests that aqueous extract of Carica papaya pulp is safe for consumption in the case of toxicity to the kidney.

Keywords: Carica papaya, Helicobacter pylori, indomethacin-induced ulcer, aqueous extract, liver enzymes, kidney, albino Wistar rats

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Morphometric Evaluations And Brain Acetylcholinesterase Activity In Albino Rats Administered Benzhezol

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ABSTRACT

Benzhexol is an antispasmodic pharmaceutical drug used for the treatment of Parkinson's and other related ailments. The present study investigated the effect of benzhexol on the morphometric parameters and brain acetylcholinesterase activities in albino rats. 60 albino rats procured from the aAnimal Breeding Unit of our institution were randomized into groups (A to D). Group A received distilled water and served as the control while groups B, C and D received 10. 20 and 30 mg/kg Benzhexol respectively for 14 days. Thereafter, the drugs were withdrawn and the rats allowed 7 days' recovery period. The body weight of the rats increased from day-1 to 14 and during the 7-day withdrawal period. Liver weight increased in exposed rat but significant at 20 mg/kg benzhexol. However, following a 7-day withdrawal period, liver weight in all the groups returned to control levels. There were no effects of the 10, 20 and 30 mg/kg dose drug exposure on the kidney and spleen weights of the rats. The hepatosomatic indices of the rats increased on exposure to benzhexol and was significant at 20 mg/kg of the drug on day-14 and remained so at the end of a 7-day withdrawal period. Brain acetylcholinesterase activities of the rat increased significantly following exposure to the drug. The effect appeared to abate at the end of a 7-day withdrawal period in all three drug dose groups. Benzhexol should be used in the environment with caution to avoid effects on non-target organisms.

Keywords: Benzhexol, Morphometric parameters, kidney, brain acetylcholinesterase

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Towards A Natural Treatment For Mania: Red Onion Husk Extract Modulates Neuronal Resilience, Redox Signalling, And Glial Activation

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ABSTRACT

This study evaluated the safety and therapeutic potential of red onion husk extract in managing manic-like symptoms and associated neurochemical dysfunctions. Acute and repeated oral dose studies were conducted in mice and rats to evaluate the safety profile of the extract. FT-IR analysis identified functional groups in the extract, while GC-MS analysis identified specific bioactive compounds in the flavonoid-rich fraction. A ketamine-induced manic behaviour model in Wistar rats was employed to assess the extract's efficacy in attenuating manic-like symptoms. Behavioural and neurochemical analyses were performed to further investigate the extract's effects. The extract demonstrated a favourable safety profile in both acute and repeated dose studies. FT-IR analysis revealed a complex mixture of organic compounds, including hydroxyl groups, alkynes/nitriles, aromatic and non-aromatic C=C bonds, amines, and polysaccharides. GC-MS analysis identified 17 bioactive compounds, including five-methyl-2-phenylindolizine, methadone N-oxide, and 3-phenylthiane, S-oxide. Ketamine administration significantly increased oxidative stress markers, TBARS, and suppressed antioxidant enzyme activities (SOD, GPx, CAT) in both the cerebral cortex and hippocampus, alongside elevated acetylcholinesterase (AchE) activity, indicating enhanced neuronal excitability. Pre-treatment with FRF (25 mg/kg) effectively mitigated ketamine-induced oxidative stress, as evidenced by reduced TBARS levels and partially restored SOD and GPx activities. Interestingly, FRF significantly increased CAT activity ($p<0.001$), potentially suggesting an additional compensatory mechanism. Notably, FRF pre-treatment also counteracted ketamine-upregulated AchE activity, offering neuroprotection against heightened neuronal excitability. Red onion husk extract exhibits a favourable safety profile and exerts potent antioxidant and neuroprotective effects, possibly through modulating Nrf2 signalling pathways. Its ability to counteract ketamine-induced oxidative stress and neuronal hyperactivity highlights its potential as a complementary therapeutic strategy for managing manic episodes in bipolar disorder. Further research is warranted to elucidate the precise molecular mechanisms underlying FRF's action and explore its clinical efficacy in human studies.

Keywords: Red onion husk extract, Mania, Ketamine model, Neurochemical modulation, Mood disorder, Natural compound, FT-IR, GC-MS, Bioactive compounds.

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Invitro Proinflammatory Activity Of Petrol And The Protective Effects Of Ethanolic Leaf Extract Of *Emilia Sonchifolia*, And *Bridelia Ferruginea*, And Ethanolic Stem Bark Extract Of Rhizophora Racemosa

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ABSTRACT

Petrol inhalation has been widely reported to be toxic to the body. Also, medicinal plants have been reported to possess phytochemicals that confer on them the ability to provide protection and healing against toxic substances. The aim of this study was to investigate the invitro proinflammatory activity of petrol and the protective effects of ethanolic leaf extract of *Emilia sonchifolia*, and *Bridelia ferruginea*, and ethanolic stem bark extract of Rhizophora racemosa by heat induced hemolysis inhibition, proteinase inhibition and protein denaturation inhibition assays. Results showed that petrol significantly enhanced heat induced homolysis, protein denaturation and proteinase activity. However, the extracts significantly inhibited these activities of petrol as shown in the values of percentage inhibitions obtained. The percentage inhibition of protein denaturation of the extracts (25–100 µg/mL) ranged from 35.24±2.61 to 89.86±2.38 for *Bridelia Ferruginea*, 38.85±2.30 to 82.32±2.66 for *Emilia sonchifolia*, and 40.43±1.82 to 76.32±2.54 for *Rhizophora racemosa.* The percentage inhibition of hemolysis was from 35.08±3.14 to 72.16±2.72 for *Bridelia Ferruginea*, 36.55±1.86 to 89.42±0.36 for *Emilia sonchifolia*, and 34.98±2.13 to 78.54±1.78 for *Rhizophora racemosa* while the percentage inhibition of proteinase activity ranged from 33. 61±2.62 to 72.77±3.16 for *Bridelia ferruginea*, 33.36±1.14 to 74.85±2.38 for *Emilia sonchifolia*, and 40.11±2.41 to76.12±2.38 for *Rhizophoria racemosa*. Results revealed that petrol possesses the capability to cause inflammation while the extracts inhibited the proinflammatory properties of petrol which may be attributed to their abundant phytochemicals.

Keywords: Petrol, toxicity, *Emilia Sonchifolia*, *Bridelia ferruginea*, *Rhizophora racemosa*

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In Vitro Anti-Flammatory And Anti-Oxidant Activities Of Ethanoic And Aqueous Leaf Extract Of *Emilia sonchifolia*

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ABSTRACT

Emilia sonchifolia is a plant that has been shown to possess abundant phytochemicals and is used to treat various ailments. This study investigated the antioxidant and anti-inflammatory activities of ethanolic and aqueous extracts of *Emilia sonchifolia*. The antioxidant activities of the extracts were investigated using Ferric Reducing Antioxidant Power (FRAP) and 2,2-diphenyl-1-picrylhydrazyl (DPPH) scavenging activities while the anti-inflammatory activities were assayed using heat induced hemolysis, protein denaturation and proteinase enzyme inhibition assays. Total phenolics and total flavonoid content of the extracts were also assayed. Results revealed that the extract have a high content of phenolics (41.44±2.06 mgGAE/g for the ethanolic extract and 43.30±3.34 mgGAE/g for aqueous extract) and flavonoids (39.33±1.78 mgQE/g for the ethanolic extract and 39.33±1.78 mgQE/g for aqueous extract). They also showed high antioxidant abilities evidenced in the low EC_{50} (0.29 for ethanolic extract and 0.23 for aqueous extract) and IC_{50} (1.39 for ethanolic extract and 1.36 for aqueous extract). Results also showed that the percentage inhibition of hemolysis of the extracts (25–100 µg/mL) ranged from 48.23±2.68 to 99.87±1.83 for ethanolic extract and 38.87±1.65 to

95.78±3.8 aqueous extract. The percentage inhibition of protein denaturation ranged from 51.62±1.82 to 94.06±1.83 for ethanolic extract and 40.45±1.23 to 99.80±3.2 for aqueous extract while the percentage inhibition of proteinase activity ranged from 46.22±1.98 to 98.30±3.10 for ethanolic extract and 36.68±1.66 to 94.81±4.60 for aqueous extract. Results revealed that the extracts possess antioxidant and anti-inflammatory properties which could be due to their richness in phenolics and flavonoids.

Keywords: Petrol, toxicity, *Emilia Sonchifolia*, 2,2-diphenyl-1-picrylhydrazyl, flavonoids, phenolics.

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Nutritional Potential And The Effect Of Ethanol And Aqueous Extracts Of Plukenetia Conophora Leaf On The Body Weight And Blood Glucose Concentrations Of Diabetic Rats

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ABSTRACT

Proximate composition and energy value, macro-mineral concentration, percentage daily value (%DV) , nutrient rich index (NRI) and the effect of ethanol and aqueous extracts of *Plukenetia conophora* leaves on the body weight and blood glucose concentration of diabetic rats were determined using standard methods. The pharmacological model was 120mg/kg b.w. (via intraperitoneal) alloxan monohydrate induced diabetic rat model, with the ethanol and aqueous extracts respectively administered orally at 200mg/kg and 500mg/kg respectively and glibenclamide administered as reference control at 5mg/kg b.w. Chemical analysis showed that all the samples were rich in crude fiber (17.7% ; %DV: 63.21), ash (11.57%) , carbohydrate (57.14%; %DV:47.71), energy (254.05Kcal/100g ; %D.V. : 19.96) . Spectrophotometric analysis data revealed potassium concentration (68.07mg/kg; %DV: 1.45) as highest while Sodium concentration (0.51mg/kg; %D.V.: 0.02) was the lowest. The potassium to sodium ratio was high (136.1) while the sodium to potassium ratio was very low (0.008) and these ratios may reveal good cardiovascular health effect of the leaf. Nutrient Rich Index (NRI) based on macronutrients and macro minerals was estimated to be 16.47. Data on the effect of the ethanol extract and aqueous extract of the leaves of *P.conophora* on the body weight and blood glucose level of the rats revealed that the extracts significantly ($p < 0.05$), time and dose dependently restored the body weights towards normal compared to the diabetic control. The extracts also significantly ($p < 0.05$), time and dose dependently lowered blood glucose concentration towards normal in treated rats. The nutritional and nutraceutical potentials of the leaves of *P.conophora* shown in this study suggest its possible use in food as cheap, effective and safe anti -diabetic agent for the management of diabetes mellitus and its associated complications.

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Comparative Study On The Effects Of Zifam Artiz (An Antimalaria Drug) And *Ficus Capensis* Aqueous Leaf-Extract On Some Haematological Indices In Albino Rats

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ABSTRACT

Zifam artiz is an artemether and lumefantrine antimalaria drug. Some drugs used for malaria treatment have been reported to have various side effects. *Ficus capensis* is a plant with different parts used by traditional medicine practitioners in Eastern Nigeria for the management and treatment of several disorders such as kidney, heart and blood related diseases. This study investigated the effects of zifam artiz (ZA) and *Ficus capensis* aqueous leaf extract (FCALE) on the concentration of hemoglobin (Hb), red blood cell (RBC) and packed cell volume (PCV) in albino rats. Twenty-eight acclimatized albino rats were separated into seven groups of four rats each. Group 1 served as the normal control. Groups 2 – 4 were administered 8.0, 16.0 and 24.0 mg/kg respectively of ZA; while groups 5 - 7 were respectively administered 200, 400 and 600 mg/kg body weight of FCALE twice daily for 7 consecutive days through oral intubation. There were gradual reductions in the weights of the rat groups administered with ZA and FCALE in a dose dependent manner compared to the control group which gained weight. Also, there were significant ($p<0.05$) reductions in the concentration of Hb, RBC and PCV in groups 2 – 4 administered with different doses of ZA, with concomitant significant ($p<0.05$) higher concentrations in groups 5 – 7 given FCALE, in a dose-dependent manner compared to the normal control. The findings of this study showed that zifam artiz may not be suitable for patients having some hematological related disorders such as anemia or hemorrhage; while *Ficus capensis* could be used in the management of anemia or other blood related diseases.

Key Words: Zifam artiz; *Ficus capensis;* Albino rats; Haemoglobin; Red blood cell; Packed cell volume.

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Enhancing Amylase Reusability And Efficiency Through Immobilization: A Waste-Derived Enzyme Approach

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ABSTRACT

Amylases are essential in numerous industrial processes, but their high production costs necessitate methods to improve their reusability and recovery from downstream products. In this study, amylase was obtained from the wastewater of *Saccharomyces cerevisiae*, *Lactobacillus delbruckii*, and *Lactobacillus coryneformis* (SLL) via the fermentation of cassava tuber. Three step enzyme purification process namely: ammonium sulfate precipitation, ion-exchange and gel-filtration chromatography. Subsequently, the purified amylase was immobilized within calcium alginate beads. Optimal enzyme activity was observed at 30°C and pH 4. Structural modifications in the immobilized enzyme were revealed through Scanning Electron Micrograph (SEM) analysis at 1000x resolution, indicating successful entrapment within the matrix. The immobilized amylase exhibited an impressive efficiency of 91.4% and demonstrated excellent reusability, with 6 cycles reported. These findings highlight the potential of the immobilization technique outlined in this study as a promising approach to enhance amylase reusability and efficiency in industrial applications.

Keywords: Enzyme biotechnology, microbial biotechnology, amylase, immobilization, Scanning Electron Micrograph

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Amelioration Of Testosterone Propionate –Induced Prostatic Hyperplasia In Male Wistar Rats By Dandelion (*Taraxacum officinale*)

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ABSTRACT

The current study investigated the effect of ethanol extract of dandelion (*Taraxacum officinale*) on testosterone propionate–induced prostatic hyperplasia and altered biochemical indices in male wistar rats. Phytochemical, Gas Chromatography-Mass Spectrometry (GC-MS), mineral and vitamin analyses were carried out on the powdered plant materials. Thirty adult male wistar rats were randomly divided into six groups of five rats: The six group animals were Group 1(Normal control) received oral body weight equivalent of water, group 2 (Extract only) received oral body weight equivalent of *Taraxacum officinale*. Group 3 (disease control) received subcutaneous administrations of 0.4 ml testosterone propionate while group 4 (Finasteride + Testosterone propionate) received oral doses of Finasteride (2 mg/kg bw) and subcutaneous administrations of 0.4 ml testosterone propionate. Groups 5 (Dandelion 400mg/kg + Testosterone propionate) and 6 (Dandelion 800mg/kg + Testosterone propionate) received body weight of subcutaneous testosterone propionate and concomitant oral body weight equivalent of *Taraxacum officinale* extract for 28 days. All rats were sacrificed;

prostates were dissected, weighed, and subjected to histopathology while the serum was used for biochemical analyses. Results indicated that relative prostate weight and serum prostate specific antigen (Biomarker of prostatic hyperplasia) levels increased significantly in the disease control compared with the normal control group ($p<0.05$). Biomarkers of renal and hepatic function, lipid and hormone profile indices were significantly ($p<0.05$) increased in the disease control while treatment with dandelion (*Taraxacum officinale*) reduced the altered biochemical indices. Prostatic hyperplasia induction resulted in heightened Malondialdehyde (MDA) levels with decreasing superoxidase dismutase (SOD), catalase (CAT), glutathione reducing power (GSH) and glutathione peroxidase (GPx) activities whereas, dandelion (*Taraxacum officinale*) co-treatment prevented depletion of antioxidants activities and heightened Malondialdehyde (MDA) levels. These results coupled with histological finding suggest that dandelion (*Taraxacum officinale*) co-treatment protected against testosterone propionate induced prostatic hyperplasia in male wistar rats.

Keywords: Testosterone Propionate, *Taraxacum officinale*, Prostate, Histpathology, Oxidative stress, Inflammation.

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Protective Potential Of *Cocosnucifera*fruit Oil On Alcohol-Induced Brain Damage In Male Albino Rats

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ABSTRACT
Cocosnucifera (Coconut) fruit oil is known to contain a rich array of nutrients, antioxidants and essential fatty acids. This study explored the protective potential of *Cocosnucifera*fruitseed oil on alcohol-induced brain damage in male albino rats. The coconut oil was extracted by wet method and its fatty acid composition analyzed using GC-MS. Twenty fivemale albino rats were randomly selected, acclimatized and divided into five groups with five rats in each group namely; G1 (Normal Control), G2 (Alcohol Control), G3 (Alcohol+ low dose oil), G4 (Alcohol+ high dose oil) and G5 (Alcohol+ DHA). The rats were administered with predetermined doses of alcohol, coconut oil and the DHA drug through oral gavage once daily for seven days. After which they were sacrificed, brain excised and homogenized in buffer. The homogenate was used for biochemical assay of Total protein, Interleukin-1 alpha (IL-1α), Tumor Necrocis Factor-alpha (TNF- α), Glutathione (GSH), Glutathione peroxidase (GPx), Superoxide dismutase (SOD), Catalase (CAT), and Malondialdehyde (MDA) content of the brain tissues using standard methods. The cerebrum and cerebellum of the brain were also sectioned, fixed and used for histopathological examination. Results showed that the coconut fruit oil contained essential fatty acids with Dodecanoic acid showing the highest concentration of 6.9960mg/l. Administration of alcohol induced significant ($p<0.05$) decrease in brain IL-1α, TNF- α, GSH and GPx compared to Control. Administration of Coconut oil significantly ($p<0.05$) increased the decreased levels of brain IL-1α, TNF- α,GSH and GPxinduced by the alcohol,compared to Control. Total protein, SOD, CAT and MDA was significantly ($p<0.05$) increased after alcohol administration compared to Control. Increase in the coconut oil dosage showed significant ($p<0.05$) decrease in Total protein, SOD, CAT and MDA compared to

Control. These results suggest that coconut oil attenuates the alcohol-induced changes in the brain damagebiomarkersassayed.

Keywords: Coconut oil, Brain damage, Alcohol, Biochemical assay, Fatty acids

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Profile, Antimicrobial Potential, And Toxicological Evaluation In Rats Given Ethanolic Leaf Extract Derived From Pueraria Phaseoloides

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ABSTRACT

Bioactive profile, antimicrobial potential and toxicological evaluation in rats given ethanolic leaf extract derived from *Pueraria phaseoloides* were investigated using standard methods. Twenty Wistar albino rats were distributed into four groups of five rats each and given different doses of *P.phaseoloides* leaf extract for twenty-one days. One of the groups served as control (group I) while groups II to IV served as test groups. Some of the phytochemicals observed in the leaf sample were saponins, flavonoids, alkaloids, and tannins. A total of sixteen compounds were observed with gas chromatography-mass spectroscopy (GC-MS). Among such compounds are tridecane ($C_{13}H_{28}$), 2-Methoxy-4-vinylphenol ($C_9H_{10}O_2$), and phytol, cetocetate ($C_{22}H_{42}O_2$), which are relatively important in agriculture, cosmetics, and pharmacological industries. Important amino acids such as glutamic acid (12.15±0.15 g/100g), lysine (6.51±0.12 g/100g), and aspartic acid (8.30±0.06 g/100g), as well as fatty acids such as myristic acid (13.59±1.12%), and linoleic acid (1.50±0.78%) were also observed in this study. *P. phaseoloides* exhibited antimicrobial activity that could position the leaf sample against some pathogens. The effect of *P.phaseoloides* ethanolic leaf extract showed significant ($p<0.05$) increase in aspartate aminotransferase (AST), alanine aminotransferase (ALT), and alkaline phosphatase (ALP) of the liver in test rats (groups I1, II1, and IV) when compared to the control. Packed cell volume (PCV) and hemoglobin concentration (Hb) of groups II rats decreased significantly ($p<0.05$) against the control but PCV and Hb levels of groups III and IV rats increased significantly ($p<0.05$) against the control. Urea, and creatinine level of the kidney in test group II reduced significantly ($p<0.05$) against the control while the test groups III and IV increased significantly ($p<0.05$) against the control. Cl^-, HCO_3^-, Na^+ levels of the test rats significantly ($p<0.05$) increased against the control.

Keywords: Bioactive profile, Antimicrobial potential, *Pueraria phaseoloides*, Leaf extracts.

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Hepatoprotective Activity Of Aqueous Leaf Extracts Of *Brillantaisia Guainensis P.Beuv* Against Carbon Tetrachloride-Induced Liver Damage In Wistar Albino Rats

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ABSTRACT

The aim of this study was to evaluate the hepatoprotective activity of aqueous extracts of *Brillantaisia guainensis p.beuv* against carbon tetrachloride-induced liver damage in Wistar albino rats. Hepatoxicity was induced subcutaneously by the injection of CCL4 diluted with olive oil (1:5 v/v mL/kg body weight) on day 4 and 8 of the experiment. The extract was administered to both normal and carbon tetrachloride treated rats at 100, 200 and 300 mg/kg. Hepatic biochemical biomarkers such as alkaline phosphatase (ALP), aspartate transaminase (AST) alanine transaminase (ALT), serum albumin, total protein and bilirubin were estimated. When compared with the test control The treatment produced lower plasma aspartate transaminase, alanine transaminase and alkaline phosphatase levels in the test groups although on the 100mg/kg concentration (BGT1) was significantly different ($p<0.05$). There was no significant difference in total, conjugated and uncongugated bilirubin. The treatment significantly ($p<0.05$) produced a higher total protein and albumin content in the test groups than the test control. The protection of the extracts against carbon tetrachloride-induced liver damage was dosage dependent with the 300mg/kg concentration being more effective. Histopathological studies on the liver sections showed that pre-treatment with the extract protected against carbon tetrachloride induced fatty degeneration of hepatocytes, thus, confirming the results of the biochemical studies. The above results imply that treatment with the plant extract protects the liver against carbon tetrachloride induced hepatotoxicity, therefore, justifying the potentiality of *Brillantaisia guainensis p.beuv* in African traditional health care for the management of liver problems.

Keywords: *Brillantaisia guainensis p.beuv*, carbon tetrachloride, hepatoxicity, hepatospecific markers, hepatoprotective, Histopathology

NSBMB/UPH/MB/064

Evaluation Of The In Vivo Antitrypanosomal Activity Of Crude Ethanolic Extract Of *Moringa Oleifera* Root Bark In Albino Rats Infected With *Trypanosoma Brucei.*

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ABSTRACT

The efficacy of the crude ethanolic root bark extract of *Moringa Oleifera* against *trypanosoma brucei brucei* infection was investigated. A total of 40 Male Wistar Albino Rats weighing between 80 – 120g were divided into 8 groups of 5 animals per group and were left to acclimatize for 1 week. Each group of animals was housed separately and fed with Vital commercial Super starter feed with clean water given ad-libitum. All animals in the treatment groups were inoculated with 100µl of 2 x 10^5*Trypanosoma brucei brucei* parasites (Federe mixed strain) per ml of blood as infection was confirmed by viewing for parasitemia on the

microscope after a pre-patent period of 5 – 6 days. Groups 1 – 4 were treated with 2500mg/kg, 1000mg/kg, 700mg/kg and 100mg/kg respectively. Groups 5 and 6 were treated with single (3.5mg/kg) and double dosages (7mg/kg) of standard Diminazene aceturate based drug (Nozomil). Groups 7 and 8 served as positive and negetive controls respectively. All animals were inoculated intraperitoneally with the parasite except the positive control group. Immediately infection was confirmed for each animal in each treatment group after a pre-patent period of 5 – 6 days, daily single dose treatment subsequently commenced for Groups 1 – 4 by oral administration with the crude extract for 7 days. Single and double dose treatment was also intramuscularly administered to the control groups treated with Standard drug. Daily parasitemia and temperature as well as weekly Packed Cell Volume and Weights of the animals were observed and presented as a reflection of the potential anti-trypanosomal effects of the plant extract. Treatment with the plant extract showed *in vivo* anti-trypanosomal activity as it increased the survival rate of treated animals by 10 days compared to the control groups.

Keywords: In vivo, Anti-trypanosomal, crude extract, *Moringa Oleifera*, Parasitemia, Survival rate.

NSBMB/UPH/MB/065

Neurodevelopment and Cognitive Impairment in Parent and Progeny of Perinatal Dietary Protein Deficiency Models

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ABSTRACT

There is an absolute dependence of the concept of development on supply of adequately balanced nutrients especially during the perinatal age which is critical to development. Therefore, an upgraded nutrition is specially required during gestation and lactation, as this isthe critical period of neurodevelopment. This study sought to investigate the effect of protein deficiency during gestation (F0) and lactation through to adolescence on neurological functions of subsequent (F1 and F2) generations, establishing the possible consequential mechanistic association. Rats in four groups were fed different rations of protein diets (PD) as formulated: 21% PD, 10% PD, 5% PD and control diet (standard rat chow, containing 16–18% protein), from adolescent through to gestation and lactation, next generations were weaned to the maternal diet group. Neurobehavioral studies (which include; Surface righting reflex, Negative geotaxis, Learning and Memory tests), brain oxidative stress and quantification of serotonin and dopamine levels in the brain were conducted. Resultsshowsignificantly altered neurobehavior, reflected in the reduction of reflex response and postural reaction score at $P \leq 0.05$. There was also a transgenerational cognitive impairment of brain function in the F-generations, following perinatal protein malnutrition as shown in the Y-maze result, measuring spatial memory and Morris water maze result (cognition), providing a background for the observed sensorimotor response. The significant increase in dopamine level, decrease in the antioxidant capacity of the protein deficient brain groups are consistent with significantly altered serotonin system, critical to neurodevelopment and functional activities of learning and memory. Therefore, persistent early life protein deficiency mediates dysfunction in neurodevelopment and this involves life-long changes in key neurotransmitters and the brain redox status underlying the neurobehavioral display.

Keywords: Neurobehavior, cognitive function, protein deficiency, neurotransmitter, transgeneration, perinatalnutrition

NSBMB/UPH/MB/066

A Glucosyl Xanthone And Esters Of Linoleic Acids As New Antimalarial Compounds Targeting *Plasmodium Falciparum* Thymidine Monophosphate Kinase (Pftmpk)

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ABSTRACT

Chemotherapy is considered the best approach in the management of malaria pathogenesis symptomized with hyperparasitemia and oxidative stress because of free radicals production; however, a crucial step in the production of DNA is the reversible phosphorylation of Dtmp to dTDP, which is catalyzed by *Plasmodium falciparum* thymidylate kinase. Ethnopharmacologically, *Mangifera indica* is used in the treatment of malaria; thereby necessitating antiplasmodial and antioxidants screening of the plant extract, as well as its *in silico* profiling to unravel the pharmacological and docking potentials of the bioactive compounds against thymidylate kinase. The collection of the *Mangifera indica* stem bark, extract preparation, *in vivo* antiplasmodial assay, *in vitro* antioxidant assay, retrieval of *Plasmodium falciparum* thymidylate kinase, and gas chromatography-mass spectrophotometry (GC-MS) were done using standard protocols. SwissADME tool was used in the prediction of the physicochemical, drug-likeness, and pharmacokinetic properties whereas molecular docking analysis was done with the MCULE tool. The GC-MS profiling revealed 2-Glucopyranosyl-1,3,6,7-tetrahydroxy-xanthen-9-one (mangiferin), esters of linoleic acids, shikimic acids etc; these compounds contributed immensely to the plant's antioxidant and antiplasmodial potentials. Also, the compounds (55.7%) successfully docked the active sites of thymidylate kinase; 72.1% and 57.4% revealed high rate of gastrointestinal tract (GIT) absorption and distribution in the interstitial tissues respectively; whereas 98.4% were not substrates of permeation glycoprotein. However, non-inhibition of CYP1A2, CYP2C19, CYP2C9, CYP2D6, and CYP3A4 were 45.9%, 98.4%, 67.2%, 95.1%, and 98.4% respectively while drug-likeness revealed 100% Lipinski's compliance. The remarkable antiplasmodial, antioxidant, and pharmacological properties of mangiferin and esters of linoleic acid qualify them as drug-like molecules for malaria treatment.

Keywords: Mangiferin, antiplasmodial, malaria, thymidylate kinase, linoleic acids, antioxidant, docking, *Mangifera indica*.

NSBMB/UPH/MB/067

Exploring The Effect Of Bioactive Compounds From Ethyl Acetate Fraction Of *Hyptis Verticillata* Jacq Plants As Potential Anti-Diabetic Agents; Dft, Molecular Docking And Pharmacokinetic Studies

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ABSTRACT

Hyptis verticillata jacq is a tropical plant widely explored for its anti-diabetic properties. The leaf extract fractions of the *H. verticillata* was theoretically investigated for its anti-diabetic potential. Theoretical investigation utilized the density functional theory (DFT) at B3LYP/def2SVP level of theory. From the frontier molecular orbital analysis, the high the ionization potential values obtained reflected greater stability of the bioactive compounds resulting in enhanced absorptivity in biological systems. The natural bond order (NBO) gave insight into the second order perturbation energy (E^2) revealing the intense molecular interactions in the increasing order of 2-Chloropropionic acid (289.56Kcal/mol) > 1, 4-Eicosadiene (91.45 Kcal/mol)> Naphthalene (89.23Kcal/mol)>2-amino-1-phenylethanol (57.22Kcal/mol) > Benzoic acid (50.23 Kcal/mol). The density of states (DOS), the overlap population density of states (OPDOS) and the partial density of states (PDOS) and the Partial density of states (PDOS) showed the various individual contributions obtained from the different molecular orbitals**.** Molecular docking simulations were performed to investigate the inhibition potential of the biologically active compounds on α-amylase and α-glucosidase. The bioactive compounds were highly promising with higher binding affinities. Comparatively, the bioactive compounds had greater inhibitory effect on α-amylase and α-glucosidase than Miglitol compared to Acarbose which were the standard drugs used. The pharmacokinetic investigation showed good gastro-intestinal absorption and oral bio-availability, solubility in aqueous medium. The toxicity studies show their inactivity to cytotoxicity. These results provide compelling evidence supporting the pharmacological suitability of *H. verticillata* plant extract for use as highly promising anti-diabetic agent.

Keywords: DFT, *In-silico* molecular docking, *Hyptis verticillata jacq* plant, ADMET.

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Protective Effects Of *Telferia Occidentalis, Dialium Guineense* And *Carica Papaya* Leaf Extracts Against Phenylhydrazine Induced Anaemia In Rats

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ABSTRACT

Medicinal plants are established sources of natural antioxidants and have been used to improve haematological values and the body's defense line against environmental oxidants. In this study, the protective and blood building effects of *Telferia occidentalis*, *Dialium guineense* and *Carica papaya* leaf extracts were investigated in phenylhydrazine induced anaemia in rats. Extracts prepared from the plants were first subjected to phytochemical and acute toxicity (LD_{50}) tests. In the haematoprotective and study, 25 adult wistar rats assigned to 5 groups of 5 rats each and comprising of control and test groups treated with phenylhydrazine and extracts were used. Treatment lasted 14 days before blood was collected from the animals for haematological analysis. Results of phytochemical analysis of the extracts showed significant amounts of tannins, phenols, flavonoids, alkaloids, saponins, steroids, terpenes and cardiac glycosides, while their LD_{50} values were all >5000 mg/kg body weight. The group treated with only phenylhydrazine had significantly lower red blood cells (2.97±0.07 $x10^6/mm^3$), packed cell volume (20.80±1.02%) and haemoglobin concentrations (7.70±0.27 g/dl) when compared with control values of 6.87±0.06 $x10^6/mm^3$, 45.40±0.51% and 14.54±0.10 g/dl respectively ($p<0.05$). *Telferia occidentalis* and *Dialium guineense* leaf extracts significantly inhibited the decline in RBC parameters caused by phenylhydrazine such that in the *Telferia occidentalis* group, RBC, PCV and Hb values were 4.50±0.20 $x10^6/mm^3$, 34.20±1.43% and 10.28±0.34 g/dl respectively while in the *Dialium guineense* group, RBC, PCV and Hb values were 3.91±0.13, 29.80±1.39% and 10.44±0.33 g/dl respectively. *Carica papaya* extract did not significantly inhibit the fall in values of these parameters in the phenylhydrazine treated rats ($p>0.05$). Therefore, *Telfairia occidentalis* and *Dialium guineense* leaves may be sources of haematoprotective agents against toxicants-induced anaemia, and may contain natural haematinic substances. Further work is required to fully establish this.

Key words: Anaemia, haemoglobin concentration, packed cell volume, red blood cells, extracts

NSBMB/UPH/MB/069

Biochemical Parameters And Enzymes Analyses In Solid-State Fermented And Biofortified Plantain Peels Using Yeasts And Plant Extracts

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ABSTRACT

This research investigated the effects of solid-state fermentation and biofortification of plantain peels using yeasts and plant extracts on biochemical parameters and enzyme analyses. Plantain peels underwent a 72-hour fermentation process using extracts from elephant grass, plantain leaves, and bitter leaf, supplemented with either 0.5 g/L of baker's yeast or palm wine yeast. Various in-vitro assays were conducted to assess changes in L-lysine concentration, soluble protein content, total phenolic content, total flavonoid content, glucose concentration, amylase activity, protease activity, and xylanase activity. The results revealed significant increases ($p<0.05$) in L-lysine concentration (up to 6.9 mg/g), soluble protein content (peaking at 32.9 mg/g), total phenolic content (reaching a maximum of 17.3 µg GAE/g), total flavonoid content (highest at 27.9 µg CE/g), and xylanase activity (up to 29.8 µ/g/min) in fermented and biofortified plantain peels compared to control samples. Glucose concentration decreased (reaching a minimum of 0.9 mg/mL), indicating efficient utilization during fermentation. Amylase and protease activities varied across samples, with certain combinations of plant extracts and yeast strains demonstrating higher enzymatic activity (e.g., amylase activity at 33.5 µ/g/min and protease activity at 36.8 µ/g/min). The combined effects of plant extracts and yeast strains suggest promising approaches for enhancing the nutritional quality of agricultural residues through solid-state fermentation and biofortification. These findings hold implications for improving food production, waste management, and nutritional security.

Keywords: Plantain Peels, Fermentation, Biofortification, Nutritional Composition, Enzyme activity.

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Molecular Evidence Of The Nephroprotective Potentials Of *Chrysobalanus Orbicularis* Flavonoid Extract In Streptozotocin-Induced Diabetic Rats

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ABSTRACT

Diabetes mellitus currently has a rapid prevalence globally making it one of the non-communicable diseases targeted by United Nations Sustainable Developmental Goals (SDG 3) so as to ensure healthy lives for all irrespective of their age. One of the major complications of diabetes mellitus is nephropathy characterized by induced kidney damage and loss of kidney function. There is need to explore natural therapeutic methods which are sustainable, innovative and safe in preventing and managing this prevalence disease condition. Hence, this study investigated the nephroprotective effect of the flavonoid extract from *Chrysobalanus Orbicularis* leaves on streptozotocin-induced diabetes in rats. The flavonoid extract of *C. orbicularis* was prepared using standard procedure. A total of 30 animals were used for this study, and were randomly divided into 5 groups of 6 rats each. Diabetes mellitus was induced using streptozotocin (45 mg/kg) and when diabetes was confirmed, treatments were

commenced for twenty eight (28) days with doses of 60 and 120 mg/kg of flavonoid extract of *C. Orbicularis* and another group administered 500 mg/kg metformin (MET). The other groups were diabetic control (DC) and normal control (NC). At the end of the experimental period, the animals were euthanized and the kidney were excised and processed for RT-PCR analysis. The study assesses relative gene expressions of kidney injury molecule-1 (KIM-1) and interleukin-1β (IL-1β).The kidney mRNA expression levels of KIM-1 and IL-1β in the diabetic group was up-regulated due inflammation and nephropathy, but on administration of 60 mg/kg and 120 mg/kg of flavonoid extract of *Chrysobalanus Orbicularis*, a down regulation was observed which was comparable to the normal control group and metformin control group. The findings indicate the use of flavonoid extract from *C. orbicularis* significantly (p<0.05) enhanced renal well-being by mitigating nephropathy in the kidney. These findings therefore suggest that the flavonoid extract of *C. orbicularis* exhibit nephroprotective properties, and can thus be screened as potential natural therapeutic agent in the prevention and treatment of diabetic nephropathy.

Keywords: Nephropathy, Diabetes mellitus, *Chrysobalanus Orbicularis*, gene expression.

NSBMB/UPH/MB/071

Antihyperplasia Activity of Ethanol Extract of *Cassia sieberiana* Leaves on Testosterone-induced Benign Prostatic Hyperplasia (BPH)

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ABSTRACT

The aim of this study was to investigate the antihyperplasia activity of ethanol extract of *Cassia sieberiana* leaves on testosterone-induced BPH in albino rats. Thirty male albino rats divided into six groups of five rats each were used for the study. Group 1 was normal control, group 2 left untreated while groups 3 and 4-6 were treated with standard drug (finasteride) and different doses of extract respectively, after induction. Experimentally BPH model was developed in the rats (group 2 to 6) by subcutaneous injection of testosterone propionate (5 mg/kg body weight (b.w)) for three (3) weeks. Subcutaneous injection of testosterone showed no significant ($p > 0.05$) change in weight gain in all the groups. The treatment groups showed decrease in weight of prostate, bladder, and prostate index compared to the untreated control, the decrease was significant ($p < 0.05$) in prostate weight and prostate index at high dose (500 mg/kg b.w) of extract. The standard and treatment groups showed significant ($p < 0.05$) increase in SOD and CAT activity compared to the untreated group. There was a significant ($p < 0.05$) decrease in serum MDA concentration in the mid and high dose treatment when compared to the untreated group. However, there was no significant ($p > 0.05$) difference observed in the activities of AST and ALT in the treatment groups when compared to the untreated group. Considering the above results, it could be concluded that *Cassia sieberiana* possesses anti-benign prostatic hyperplasia effect as observed in the reduction of prostate tissues.

Keywords: Benign prostatic hyperplasia; antioxidants; oxidative stress; prostate tissues.

NSBMB/UPH/MB/072

Prevalence of Malaria Infection Among Hostel Residential Students At Federal Polytechnic, Bali

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ABSTRACT

Malaria prevalence was assessed among dormitory residential students at Federal Polytechnic Bali in Taraba State, Nigeria, between June and September 2023. The study comprised 300 students aged 15 to 38 years, including 164 males and 136 females. Venous blood samples were taken and microscopically examined for malaria parasites on Giemsa-stained thick and thin blood films. Out of the 300 blood samples studied, 118 tested positive for the malaria parasite, yielding an overall prevalence rate of 39.33%. *Plasmodium falciparum* was detected in all positive cases. Males had more infections (70.575%) than females (47.33%); however, the difference was not statistically significant ($P > 0.05$). Age groups 21-26 years had the highest prevalence (55.10%), followed by 27-32 years (42.86%), 33-38 years (29.55%), 15-20 years (26.39%), and those above 38 years had the lowest (21.74%). This was not statistically significant ($p > 0.05$). Infection prevalence rates varied by department, with Office Technology and Management (55.7%), Accountancy (50%), Electrical/Electronic Engineering (47.22%), Crop Production Technology (42.42%), Animal Health and Production Technology (38.10%), Agricultural Technology (34.21%), Business Administration and Management (30%) and Science Laboratory Technology (25%). There were no statistically significant differences ($p > 0.05$) between the departments. However, there is a need for awareness among students through health education in the form of seminars and workshops in order to control the disease.

Keywords: Prevalence, Malaria, Infection, Students, Hostel.

NSBMB/UPH/MB/073

Carica Papaya Black Seeds Suppresses Testosterone-Induced Benign Prostate Hyperplasia In Rats

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ABSTRACT

The use of medicinal plants in the management of various diseases has increased tremendously in global health because of their bioactive phytochemicals. One of such medicinal plant is *Carica papaya*. This research investigates the therapeutic potentials of ethanol extract of *Carica papaya* black seeds (EECPBS) in testosterone-induced benign prostatic hyperplasia (BPH) in rats. BPH was induced by subcutaneous injection of testosterone 3 mg/kg b.w to the experimental rats for 28 days. Group 1-3 were the controls; while groups 4-6 were induced and treated with 100, 200, and 400 mg/kg of the EECPBS. Each group was treated for 28 days and on the 29th day, the animals were sacrificed. Blood samples were collected and organs of interest collected, weighed, and then prepared for biochemical assay using standard procedures. The experimental results showed that the oral administration of EECPBS decreased prostate

weight and prostatic index, levels of acid phosphatase (ACP), protein specific antigen (PSA), Dihydrotestosterone (DHT), Testosterone, Malondialdehyde (MDA), Total cholesterol (TC), Triacylglycerol (TAG) and Low-density lipoprotein (LDL-C) whereas increased Catalase (CAT) and Superoxide dismutase (SOD) activities and High-density lipoprotein (HDL-C) level compared to the untreated control group. From our study, EECPBS showed a good dependable ameliorative effect on the prostate and testes and exerted anti-BPH, anti-lipidaemia, and antioxidant effects in testosterone-induced BPH rats. Therefore, could be used in the treatment of testosterone-induced BPH.

Keywords: Antioxidants, Benign prostate hyperplasia, *Carica papaya*, Oxidative stress, Phytoconstituents

NSBMB/UPH/MB/074

Chemical Profiling Of Volatile Compound In Lacatomtom And Its Effect On Human's Acetylcholinestrase And Human's Butylcholinestrase In-Silico Studies

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ABSTRACTS

This study is aimed at profiling the chemical composition using GCMS and investigating the effect on human acetylcholinesterase (hAChE) and human butylcholinestrase (*h*BChE) using an *in silico* approach. A blinding docking approach was conducted to analyse the binding affinity of each compound against *h*AChE and BChE. Forty-four (44) chemical compounds were identified in the mixture solution. z,z-10,12-hexadecadien-1-ol, n-hexadecanoin acid, methyl_12-hydroxy-9-octadecenoate and E-11-hexadecenal with RT of 2.44, 10.83, 24.737 and 7.235 respectively were identified to abundant in the mixture. The results of the molecular docking of the GC-MS-identified compounds, co-crystalized ligands (dihydrotanshinone I and tacrine), and reference compounds against *h*AChE and *h*BChE revealed ranges of binding energies: −8.0 to −6.9 and −9.0 to -6.0 kcal/mol for *h*AChE and *h*BChE, respectively. Based on the binding scores, docked poses, and interactions with the amino acid residues of the respective proteins, the top four compounds were selected, and the selected conformers of the lead compounds were analyzed. Propionyl codeine(PP) (-7.7 and -9.3 kcal/mol), 2,1,3-Benzoxadiazole-5,6-dicarbonitrile 1-oxide (BDCO) (-7.4 and -7.6 kcal/mol), 3,3'-Dipyrazole,1,1'-dinitro (DPDN) (-7.4 and -7.4 kcal/mol), and Propanoic acid, 2-methyl-, 3-phenyl-2-propenyl ester (PAMPP) (-7.1 and -7.2 kcal/mol) were the lead compounds that exhibited high binding tendencies to both protein targets (*h*AChE and *h*BChE respectively). Further study showed that PP and PAMPP demonstrated the potential to permeate the blood-brain barrier (BBB) from an in silico ADMET investigation, suggesting possible central nervous system effects. In contrast, BDCO is less likely to have such effects, and DPDN was not predicted to permeate the BBB. PP was predicted to exert inhibitory effect on CYP2D6 and CYP3A4, BDCO was a substrate of CYP1A2, while PAMPP showedselective inhibition of CYP2C19. DPDN does not significantly inhibit major CYP enzymes. This silico study showed

that LTT has an effect on both enzymes and is likely to have an effect on the central nervous system; therefore, efforts should be put in place to address violations of usage.

KEY WORDS: Lacatomtom molecular docking, ADMET, human acetyl cholinesterase and human butylcholinestrase

NSBMB/UPH/MB/075

Potentials of ethanol leaf extract of *C. aconitifolius* in phenylhydrazine-induced anemic rats

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ABSTRACT

This study investigates the anti-anemic properties of ethanol extract of *Cnidoscolus aconitifolius* (EECA) leaves in phenylhydrazine-induced anemic rats. Acute toxicity (LD_{50}) was done using Lorke's method. Twenty-five (25) male Wistar albino rats were randomly divided into five groups of five rats each and used for the antianemic studies. Group A, B and C served as the normal control, anemic untreated (negative control) and anemic group treated with 1ml/kg emzoron (positive control) respectively. Groups D and E were treated with 100mg/kg and 200mg/kg of ethanol extract of *C. aconitifolius* respectively by oral gavage once a day for 14 days. Anemia was induced by intraperitoneal injection of 20 mg/kg phenylhydrazine for four consecutive days in groups B to E. At the end of 14 days treatment, biochemical analysis were done using standard diagnostic methods and haematological parameters were analysed using an automated haematology analyzer (Mindray-BC-5300). The result of the LD_{50} study showed that the extract may not be very toxic. The extract was able to restore the impaired biochemical parameters caused by phenylhydrazine to normal after 14 days of treatment. The antianemic effects of EECA was demonstrated by significant increases ($p<0.05$) in the hemoglobin (HGB), packed cell volume (PCV) and red blood cell (RBC) count of the extract-treated groups after 14 days of treatment compared to the anemic untreated control group. There was a better increase in the hemoglobin levels of 100 mg/kg EECA (13.40±0.35) compared to 200 mg/kg EECA (12.50±0.45). Also, the packed cell volume increased more in 100 mg/kg EECA (40.97±0.87) compared to 200 mg/kg EECA (38.73±1.63). A better increase was observed in the red blood cell count of 100 mg/kg EECA (5.83±0.35) compared to 200 mg/kg EECA (5.55±0.44). The EECA was well tolerated by the animals as was seen from the results of the biochemical parameters. The extract also improved the haematological parameters of the animals. The animals that were treated with 100 mg/kg bodyweight yielded a far much better result by totally restoring the haematological parameters of the phenylhydrazine-induced anemic rats to normal without any observable alterations in the biochemical parameters investigated.

Keywords: Anemia, ethanol extract, Biochemical, Hemoglobin, Packed cell volume, Red blood cells.

NSBMB/UPH/MB/076

Comparative Study of the Antidiabetic and Biochemical Effects of Some Medicinal Plants in Alloxan-Induced Diabetic Rats

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ABSTRACT

Diabetes mellitus is a metabolic disorder characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Diabetes mellitus is a global health concern with rising prevalence rates worldwide. The research work investigated the antidiabetic and hepatoprotective effects of some medicinal plants in alloxan-induced diabetic rats These plants include Anacardium occidentale, *Eucalyptus globulus*, *Psidium guajava*, *Xylopia aethiopica* and herbal formulations of *Anacardium occidentale* + *Eucalyptus globulus*, *Psidium guajava* + *Xylopia aethiopica*. Experimental subjects were male rats of average weight 150g, acclimatized for seven days and maintained on a 12 hour light, dark cycle at tropical conditions. The rats had free access to water and fed with a commercial diet (growers mash) *ad libitum*. They were randomly caged in fifteen groups of four animals per group, and then treated for 40 hours. Administration of the chloroform extracts at a dose dependent concentration of 100mg/kg and 250mg/kg body weight brought about percentage decreases in blood glucose concentrations. There were significant decreases ($p<0.05$) between the diabetic untreated group and the diabetic treated groups, likewise with the control group in the mean plasma aminotransferases, alkaline phosphatase, total cholesterol, triglyceride and MDA levels. Also there were significant increases ($p<0.05$) in the activities of superoxide dismutase, glutathione peroxidase, catalase and vitamin C concentrations in diabetic treated groups as compared with the diabetic untreated group. There were no significant differences ($p>0.05$) observed between the glibenclamide treated group in the activities of superoxide dismutase, catalase. Alanine aminotransferase and total cholesterol concentrations compared to some sample treated groups.

Keywords: Antidiabetic, Aminotransferases, Alkaline phosphatase, Catalase, Superoxide dismutase, Total cholesterol.

NSBMB/UPH/MB/077

Evaluating The Therapeutic Potential of Vernonia amygdalina Leaf Extracts on Biochemical Parameters and Organ Protection In Alloxan-Induced Diabetic Rats

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ABSTRACT

The rising prevalence of diabetes and the side effects associated with chemical medications highlight the need for alternative non-pharmacological treatments. *Vernonia amygdalina* is a commonly used medicinal herb with potential therapeutic benefits. This study aimed to evaluate the effects of aqueous leaf extracts of *Vernonia amygdalina* on selected biochemical parameters in alloxan-induced diabetic rats. Diabetes was induced in male Wistar rats via intraperitoneal injection of alloxan (150 mg/kg). The rats were then randomly assigned to four groups: Group 1 (Normal rats), Group 2 (Diabetic control rats), Group 3 (Diabetic rats treated with Vernonia amygdalina at 80 mg/kg), and Group 4 (Diabetic rats treated with glibenclamide at 5 mg/kg). The extract was administered orally for 28 days. Treatment with *Vernonia amygdalina* resulted in a significant reduction in blood glucose and glycated hemoglobin levels in diabetic rats compared to the diabetic control group ($P < 0.001$). Additionally, after 28 days of oral administration, the extracts significantly decreased the altered biochemical parameters in diabetic rats compared to the untreated controls ($P < 0.05$). Specifically, *Vernonia amygdalina* significantly reduced the elevated levels of alanine aminotransferase (ALT), aspartate transaminase (AST), and alkaline phosphatase (ALP) ($P < 0.05$). Furthermore, the administration of *Vernonia amygdalina* extract demonstrated hepatoprotective and nephroprotective effects, as evidenced by the reduction in liver enzyme levels and improvement in kidney function markers. In conclusion, the aqueous leaf extract of *Vernonia amygdalina* exhibited beneficial effects on selected biochemical parameters in alloxan-induced diabetic rats, indicating its potential as a therapeutic agent for diabetes management.

Key words;- *Vernomia amygdalina*, *Irvingia gabonensis*, Alloxan, benclamide, kidney profile, Glycated haemoglobin

NSBMB/UPH/MB/078

Prevalence of Malaria/ Typhoid Co-infection Among Population in Rumuosi Municipal, Obio-Akpor Local Government Area, Rivers State Nigeria.

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ABSTRACT

This study was conducted to assess the incidence of malaria and typhoid co-infections among a random population set in Rumuosi Municipal of Obio-Akpor Local Government Area of Rivers State. Three hundred and twenty (320) individuals were examined, their blood samples were subjected to microscopic examination and widal agglutination tests, for identification of Plasmodium parasites and antibodies to Salmonella enteric serovar typhi respectively. A questionnaire was administered to obtain information on malaria/typhoid management practices. Out of the 320 blood samples analysed, 307 (95.9%) were positive for malaria, 240 (75%) were positive for salmonella enteric serovar typhi, and 297 (92.8%) were positive for both typhoid and malaria. Of the infected cohort, the highest incidence was for mild infection

for malaria (for all age categories and sexes). For typhoid infection, the highest incidence was mild infection for males (62.2% for 0-19 years) while for females the highest incidence was moderate infection (42.1% for 40-59 years). However, prevalence of malaria parasite was not statistically significant in relation to sex ($p > 0.05$) as males had 94.3% prevalence, and females, 97.5%. For Salmonella enteric serovar typhi, the prevalence was not statistically significant in relation to sex ($p > 0.05$); while males had 94.4% prevalence for salmonella enteric serovar typhi, females had 91.3%. Sex also showed no statistical significance ($p > 0.05$) concerning prevalence rate of malaria/typhoid co-infection; males had 94.3% co-infection rate while females had 92.3%. A great percentage of respondents (above 60%) revealed environmental sanitation as the best prevention/control method. Treatment options recorded varied responses but self-medication from pharmacies was predominant (above 50%). Both malaria and typhoid were prevalent among the studied population with a high rate of co-infection. Co-infection was higher in males than in females and orthodox drugs from pharmacies was the commonest treatment strategy. In addition to true co-infection of malaria and typhoid, false diagnosis due to similar signs and symptoms and false positive results are major challenges on managing these diseases.

Keywords: Malaria, Typhoid, Plasmodium, Salmonella, Co-infection, Fever, Municipality.

NSBMB/UPH/MB/079

Vivo Anti-Plasmodial Effect of Ethanol and Aqueous Extracts of *Alchornea cordifolia*

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ABSTRACT

Ethanol and aqueous extracts of the leaves, stem bark and roots of Alchornea cordifolia were tested for in vivo anti-malarial activity in 27 Swiss albino mice infected with chloroquine resistant Plasmodium bergei NK 65. The plant extracts were administered to the animals intraperitoneally, at a dose of 100 mg/kg b.w.t., and compared with Artesunate (1.6 mg/kg) and Chloroquine (10 mg/kg) administered and an untreated control group. Ethanol yielded more extracts from the leaves and stem bark than water. Tannins, flavonoids, anthraquinones, alkaloids and glycosides were widely distributed in both ethanol and aqueous extracts of the plant. All animals administered the plant extracts and Artesunate gained weights in comparison with the chloroquine and untreated groups. The animals in the untreated and chloroquine treated groups died due to the infection at the end of days 5 and 10 respectively. The Artesunate group was eradicated of parasitemia by the 7th day. Comparison of the parasitemia levels of the plant's extracts treated groups between days 0 and 14, showed that while ethanol leaves, stem bark and root extracts reduced parasitemia by 72.22%, 50.00% and 20.00% respectively, those of aqueous extracts reduced parasitemia marginally by 0%, 9.50% and 19.17% respectively. The results indicate that ethanol extracted active phytochemicals more from the leaves and stem bark of the plant than water, and that the presence of these secondary metabolites might be responsible for the higher anti-malarial activity observed with the leaves and stem bark extracts. This confirms the folkloric preferential use of A. cordifolia leaves as an anti-malarial agent.

NSBMB/UPH/MB/080

Impaired *PRS* Disrupts Cell Signalling in Yeast and Causes Neurological Disorder in Humans

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ABSTRACT

Phosphoribosyl pyrophosphate (PRPP) is a crucial metabolite that plays a central role in various life processes, including the *de novo* and salvage biosynthesis of purine and pyrimidine nucleotides, making it essential for life. In humans, mutations in phosphoribosyl pyrophosphate synthetase (*PRPS*) genes are associated with neurological disorders such as Arts syndrome and Charcot-Marie-Tooth disease (CMTX5). The human genome harbours three *PRS* genes, two of which are X-linked, while the *Saccharomyces cerevisiae* genome contains five paralogous genes. The yeast *PRS* genes form two complexes: a heterodimer, Prs1/Prs3, and a heterotrimer, Prs2/Prs4/Prs5. The signal generated by an integrated GFP-Prs1 construct depends on the presence of Prs3. Prs1 interacts not only with Prs3 but also with Slt2, the MAPK of the Cell Wall Integrity (CWI) pathway, as demonstrated by co-immunoprecipitation. Point mutations in PRS1, corresponding to the missense mutations associated with human neuropathies or the binding sites for divalent cations and/or PRPP disrupt CWI signalling, resulting in temperature and/or caffeine sensitivity. Prs5 is unique in that it contains two non-homologous regions (NHRs), with one, NHR5-2, having three phosphorylation sites. Mutations in these amino acid residues impair the expression of the transcription factor known as resistance to lethality of $MKK1_{p386}$ overexpression (Rlm1), a key component of the CWI pathway, and reduce temperature-dependent transcription of FK506 sensitivity (FKS2), the gene responsible for the stress-induced catalytic subunit of 1,3-β-glucan synthase, which is crucial for the maintenance of CWI. The findings presented support the notion that the *PRS* gene family provides a link between primary metabolism and CWI through gene duplication and the acquisition of NHRs.

Keywords: Cell signaling, co-immunoprecipitation, neurological disorders, cell wall integrity

NSBMB/UPH/MB/081

Evaluation Of Concentration Of Heavy Metals In Selected Baby Food In Bayelsa State

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ABSTRACT

This study presents an analysis of the heavy metal concentrations in four distinct Baby foods samples. The samples were subjected to dry ashing as a method of digestion, and the heavy metal content was afterwards assessed using an atomic absorption spectrophotometer. Based on the findings, it was observed that Cerelac exhibited the greatest content of arsenic, measuring 0.0052 parts per million (ppm), while Kendamil displayed the lowest concentration

at 0.0037 ppm. Cerelac had the highest lead concentration at 0.0072 parts per million (ppm), whereas Kendamil demonstrated the lowest lead concentration at 0.0056 ppm. The analysis of cadmium levels in the samples of Cerelac and Nutribom revealed that Cerelac exhibited the greatest concentration of 0.0036 parts per million (ppm), whereas Nutribom displayed the lowest concentration of 0.0021 ppm. The maximum recorded concentration of copper in Cerelac was 3.5057 parts per million (ppm), while the minimum concentration was 2.7463 ppm. The recorded values of mercury ranged from 0.0001 to 0.0003 parts per million. The concentrations of nickel (Ni) exhibited variation among the tested products, with Kendamil displaying the lowest concentration at 0.0049 parts per million (ppm), while Cerelac exhibited the highest concentration at 0.0078 ppm. The highest iron content was seen in Nutribom at a concentration of 1.4806 parts per million (ppm), while the lowest iron content was found in Peak Infant at a concentration of 0.5342 ppm. The readings collected were found to be below the permitted limit set by the World Health Organization (WHO).

Key Words: Baby foods, spectrophotometer, Cerelac, Nutribom, WHO.

NSBMB/UPH/MB/082

Enzymatic sacharification of rice husk pretreated with organic acids using cellulase obtained from *Pichia kudriavzevii* strain ITD-1MA-90.

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ABSTRACT

Rice husk is an abundant and neglected agricultural waste, which constitutes a serious environmental problem in Nigeria. Rice husk can be harnessed for glucose production, a good way of converting waste to wealth. Due to the presence of amorphous polysaccharide chains in hemicellulose, mild organic acid pretreatment of rice husk can effectively reduce its resistance to enzyme hydrolysis and subsequently improve the amount of reducing sugar released during enzymatic saccharification. Cellulase producing fungi was isolated from moistened rice husk, which was exposed for microbial growth. The pure isolate was characterized using 18S-rDNA sequencing technology. *Pichia kudriavzevii* strain ITD-1MA-90 cellulase was purified 1.9 fold with specific activity and yield of 17.36 U/mg and 42.9%, respectively. The pH and temperature optima were 5.5 and 50˚C. The Michaelis constant (K_m) and maximum velocity (V_{max}) obtained from the Lineweaver-Burk plots of initial velocity data at different concentrations of carboxymethyl cellulose were 0.1 mg/ml and 5000U, respectively. The enzyme activity was enhanced by Co^{2+} and Fe^{2+}. The rice husk was pretreated in succinic acid, tartaric acid, and citric acid (1%) at 180˚C for 120 min. Enzymatic sacharification of the pretreated rice husk was carried out at 37˚C for 3 days. The saccharification studies showed that rice husk pretreated with citric acid gave the highest glucose yield followed by succinic acid and then tartaric acid when compared with the control, which was not pretreated. This organic acid hydrothermal pretreatment approach provides a new drive for agro-waste transformation into value added products such as glucose and bioethanol.

Keywords: Rice husk, organic acid, 18S-rDNA, *Pichia kudriavzevii* strain ITD-1MA-90, cellulase and saccharification

NSBMB/UPH/MB/083

Effect of Pink Water Biosolve on Expression of some Cytokines in Hepatocyte of Wistar Rat.

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ABSTRACT

The level of expression of pro-inflammatory and anti-inflammatory cytokines in liver cells of Wistar rats exposed to drinking water obtained from cleaned-up environment was investigated in this study. Reverse transcriptase PCR technique was used to assess the expression of selected hepatic cytokines. The results showed that 10% Soluble Crude Oil Portion (SCP) caused an increased expression of the Interleukin 1-beta (IL-1β), Nuclear Factor kappa-B (NF-κB), Interleukin 6 (IL-6), Interleukin 10 (IL-10), Mitogen-activated protein kinase 8 (MAPK8) and Toll-like receptor 4 (TLR4) respectively when compared to the control. The combination of 10% SCP with 0.36mg/kg BS and 0.50mg/kg BS respectively caused significant ($p<0.05$) increases in the expression of IL-6, IL-10, MAPK8 and TLR4 respectively. IL-1B was non significantly ($p<0.05$) increased when compared to the control. This suggests that the presence of the substance in underground/surface water, if found in concentration as low as 0.36mg/kg, would be toxic to Wistar rats when consumed over a prolonged period (above 2 weeks).

Keywords: BioSolve, pro-inflammatory cytokines, anti-inflammatory cytokines, water, clean-up, remediation.

NSBMB/UPH/MB/084

The Curative Potentials of Aqueous and Ethanolic Extract of Phyllanthus amarus Leaf on 1, 2 Dimethylhydrazine Induced Colon Carcinogenesis in Balb /C Mice

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ABSTRACT

The present study investigated the ameliorative potentials of Aqueous and Ethanolic extract of *Phyllanthus amarus* leaf on 1, 2-Dimethylhydrazine induced colon cancer in Balb /C Mice. Thirty female Balb / C Mice of weight 25-30g were acclimatized for a week and randomized into 6 groups (5/group) .Group A (-DMH), Group B(+DMH), Group C(DMH+250mg/kg body weight of Ethanolic extract of *P. amarus*), Group D (DMH+350mg/kg body weight of ethanolic of *P.amarus*),Group E(DMH+250mg/kg body weight of Aqueous extract of *P.amarus*), Group(DMH+350mg/kg body weight of Aqueous Extract of *P.amarus*). 20mg/kg

body weight of DMH was administered orally for 21 days (twice a week). The plant extracts were administered daily for 3 weeks with the aid of a gavage immediately after colon cancer induction. Colon cancer was evaluated by the formation of Aberrant Cryptic Foci in the colon of DMH treated Mice. Administration of the plant extracts (Aqueous and Ethanolic) ameliorated the carcinogenic effect of DMH in the colon of DMH treated mice dose dependently by significantly reducing the number of Aberrant Cryptic Foci formed in extract treated Mice by 38% for 350mg/kg body of ethanolic extract and by 22% for 350mg/kg body of aqueous extract of *Phyllanthus amarus*. The studied extracts had ameliorative potential on DMH induced colon cancer in Balb / C Mice in a dose dependent manner. Notably, 350mg/kg body of both extracts had better reduction of AFC compared to 250mg/kg body of both ethanolic and aqueous extracts of *Phyllanthus amarus*.

Keywords: DMH (Dimethylhydrazine) *Phyllanthus amarus*, Aberrant Cryptic Foci (ACF) and Carcinogen.

NSBMB/UPH/MB/085

Level of Osteoporosis Biomarker (Alkaline Phosphatase) in Female Wistar Rats Administered Female Aphrodisiac

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ABSTRACT

Osteoporosis is a prevalent skeletal disorder characterized by reduced bone mineral density and increased fracture risk, particularly in postmenopausal women. This study aims to investigate the effects of a female aphrodisiac on osteoporosis biomarkers, including alkaline phosphatase (ALP), glucose oxidase, and triglycerides glucose index (TyG index), in females. Twentyone (21) female Wistar rats were grouped into seven (7), with three rats in each treatment. Doses of 10.53, 19.70, 8.10, 16.06, and 25;50 mg/kgbw were administered to groups 1, 2, 4, 5 and 6, while group 3 was the placebo and group 7 was the standard drug administered at the dose 0.70mg /kgbw. The drug sample was administered to test groups on daily basis for twentyone days. The experimental animals were sacrificed and serum was collected from the blood samples. Test results for the ;parameters tested (i.e. ALP, GXO and Triglycerides) were recorded and Triglyceride – glucose index was also determined. The values of the serum ALP in groups 1 and 2 was found to be 19.96,± 5.88, and 48.43 ± 20.93 mmol/dl while those of 3, 4, 5, 6, and 7 were 10.76± i.66, 9.06,± 0.53, 9.16,± 0.40, 8.93,± 0.26 and 8.80 ,± 1.02 mmol/dl. Drop in the ALP level clearly indicates lost in the intergrity the bones (Bone density) which is indicative of osteoporosis.

Key words: Osteoporesis, Alkaline phosphatase, Glucose oxidase, Triglycerides, TyG index.

NSBMB/UPH/MB/086

Mutagenic Evaluations In *Amietophrynus Regularis* And *Agama Agama* At Anyingba University Community, North-Central, Nigeria

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ABSTRACT

The potential of toads (*Amietophrynus regularis)* and lizards (*Agama agama)* as biomarkers for assessing environmental pollution levels was investigated at Anyingba, Blood was sampled for cytogenetic analysis in the two animal species. The study demonstrated significant induction of micronuclei (MN) and nuclear abnormalities such as bi-nucleated blood erythrocytes, nuclear bud, notch nucleus, vacuolated nucleus, and lobe nucleus in the toads and lizards, suggesting cytotoxic effects from the environment. The results obtained suggest pollution of the community and demand crucial environmental monitoring and control to reduce the possible health risks on the faunal community in the environment.
Keywords: Pollution, animal species, cytotoxicity, health risk

NSBMB/UPH/MB/087

Association Of 368A>G Transition In Testis-Specific H2BFWT Gene With Male Infertility

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ABSTRACT

Reproduction is the only characteristic of living organism that ensures continuity of life. However, the reproducing ability of organisms can be compromised by numerous factors thereby leading to infertility. Male infertility is a reproductive disease affecting about 100 million men within reproductive ages globally. Non-idiopathic male infertility is associated with alteration in both the spermatogenic and sperm delivery systems. The testis-specific *H2BFWT* (H2B family, member W), a testes-specific histone, essential for spermiogenesis. The present study aimed to investigate the association of 368A>G transition in testis-specific *H2BFWT* gene with male infertility in Nigerian population. The 120 adults, including 60

infertile and 60 fertile men are recruited from Zamfara State. The genotyping was performed using amplification refractory mutation system-polymerase chain reaction (ARMS-PCR). In the overall analysis, it was found that 48.33%, 11.67% and 40%, of the infertile men, were heterozygous (AG) and homozygous A and G, while 76.67%, 18.43% and 5% of the fertile were heterozygous and homozygous A and G. Morever, the G allele (odd ratio [OR] = 0.4301, 95% confidence interval [CI] = 0.246 – 0.371, P = 0.002) was associated with male infertility. Similarly, a significant association was observed between the SNP rs553509 withl low sperm count. It is concluded that H2BFWT gene rs553509 (368A>G) polymorphisms might be genetic risk factors for male infertility.

Keywords: Male infertility, H2BFWT gene, genetic polymorphism, reproduction

NSBMB/UPH/MB/088

Expression of Congopain, the major cysteine protease of *Typanosoma congolense* in a bacterial expression system

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ABSTRACT

This study was carried out to express *Trypanosoma congolense* cysteine protease (congopain) gene in *Escherichia coli BL21 (DE3) strain*. Two (2) Albino Wister Rats were inoculated intraperitoneally with 10^4 parasite/ml and the blood of the animals were monitored for the presence of the parasites. At peak parasitaemia, animals were sacrificed using chloroform anesthesia and blood was collected via cardiac puncture in EDTA container. Genomic DNA was extracted from the infected blood and amplification of the congopain was carried out. The amplicons generated were purified and digested using Sal1 and HindIII. The resulting digests were cloned into a HisSUMOStrep tagged pET-28a expression vector and Chimeras were generated. The resultant chimeras (pET-28aHisSUMOStrep-CP2 and pET-28aHisSUMOStrep-C2) were transformed in *E. coli* system, and screened for positive clones. Thereafter, the positive clones were grown on LB medium supplemented with β-D-1-thiogalactopyranoside (IPTG). The cells containing the recombinant protein were lysed and SDS PAGE was conducted followed by western blot. The molecular weight of 30kDa and 18kDa for the full length and truncated portion of congopain were seen in the western blot respectively. Producing a reagent level of recombinant enzyme is very paramount when it comes to their downstream application. Our study exploited the potential of the bacterial expression system in an attempt to over express the recombinant enzyme. However, there is need for further optimisation to be carried in other to truly appreciate the role of the enzyme when it comes to it downstream application.

Keywords: *Trypanosoma congolense*, Cysteine protease, Congopain, Bacterial expression system

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Comparative Assessment Of The *In Vitro* Antioxidant Potential Of *Tapinanthus Preussii* Leaf Aqueous And Ethanolic Extracts

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ABSTRACT

The significance of antioxidant properties in medicinal plants lies in their ability to combat detrimental free radicals, which are linked to various conditions like diabetes mellitus, cancer, atherosclerosis, and visual impairment. *Tapinanthus preussii*, a hemiparasitic epiphyte species of African mistletoe in the Loranthaceae family, thrives mainly in the wet tropical biome across Southeast Nigeria to West Central Tropical Africa, showcasing diverse medicinal potentials. This study aimed to compare the total phenolic contents, flavonoid contents and various antioxidant capacities of *Tapinanthus preussii* crude leaf aqueous and ethanolic extracts. The in-vitro evaluation included hydrogen transfer reactions (e.g., ORAC, TRAP) and electron transfer reactions (e.g. TAC, TEAC, FRAP, DPPH, hydroxyl radical scavenging, and nitric oxide radical scavenging assays). The analysis revealed significantly ($p<0.05$) higher total phenolic contents (1968.89 µg/ml GAE) and total flavonoid contents (13120.99 µg/ml QE) in the ethanolic extract compared to the aqueous extract (360.34 µg/ml GAE and 280.99 µg/ml QE respectively). The ethanolic extract exhibited significantly ($p<0.05$) higher TAC (1870.54 µg/ml AAE), FRAP (3372.99 µg/ml AAE), trolox equivalent antioxidant capacity (38363.64 ug/ml trolox) and reductive potential (09.59 µg/ml AAE) compared to the aqueous extract (497.10 µg/ml AAE, 2275.95 and 6415.5 ug/ml trolox µg/ml AAE, 04.07 µg/ml AAE respectively). These results highlights the superior antioxidant potential of the ethanolic extract, indicating ethanol as a more efficient solvent for extraction contributing to the plant's overall antioxidant capacity. In conclusion, *Tapinanthus preussii* leaf ethanolic extract shows promise as a relatively better natural antioxidant with potential therapeutic benefits against diseases associated with free radicals.

Keywords: Antioxidants, Medicinal plants, Free radicals, *Tapinanthus preussii*, African mistletoe

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In Vitro Evaluation of the Antioxidant and Anti-inflammatory Potential of *Ageratum conyzoides* Methanol and Aqueous Leaves Extract.

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ABSTRACT

This study was targeted at the *in vitro* evaluation of the Total phenolic (TPC) and Total flavonoid (TFC) contents, antioxidant activity and anti-inflammatory effect of the methanol and aqueous leaves extract of an aromatic herb *Ageratum conyzoides*, used traditionally in the treatment of wide spectrum of diseases. Total phenolic (TPC) and total flavonoid (TFC) contents were assayed using spectrophotometric methods. Antioxidant capacities of the extracts was assayed using three methods: DPPH free radical scavenging, ABTS radical scavenging, and H_2O_2 scavenging assay. The different extracts were also assayed on membrane stabilization against heat-induced haemolysis, inhibition of albumin denaturation and anti-proteinase activity to establish *in vitro* anti-inflammatory potentials. The TFC of the methanol extract (37.08 ± 3.15 mg quercetin equivalent/g of extract) is significantly higher than the aqueous extract (14.39 ± 4.16) and the TPC is significantly higher in the aqueous extract (231.25 ± 1.31 mg gallic acid equivalent/g of extract) compared to the methanol extract (190.51 ± 2.81). The methanol extract demonstrated a higher DPPH radical scavenging activity (IC_{50} = 112.22 µg/ml) when compared to the aqueous extract (IC_{50} = 314.10 µg/ml). Also, the aqueous extract demonstrated higher ABTS and H_2O_2 scavenging activity with IC_{50} values of 114.77 and 276.73 µg/ml, respectively. Both extracts showed *in vitro* anti-inflammatory activity via specific mechanisms of membrane stabilization against heat-induced haemolysis, Inhibition of albumin denaturation and inhibition of proteinase enzymes in a dose-dependent manner even higher than the standard aspirin. The methanol and aqueous extract of *Ageratum conyzoides* may serve as sources of antiinflamatory and antioxidant agents.

Key word: Anti-inflammatory, Antioxidant, Anti-haemolytic, *Ageratum conyzoids*

NSBMB/UPH/MB/091

Ginger (*Zingiber officinale*) Downregulate HER4through inhibition of NRF2 signalling pathway leading to reduced ovarian cancer proliferation

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ABSTRACT

Ginger (Zingiber officinale) is a natural product that has many health benefits. It has been shown to inhibit cancer cell migration and invasion in in vitro cancer cells and in vivo animal models. Nuclear factor (NRF2) and HER family regulate the normal cellular proliferation and maintenance and determining the cancer initiation and progression. Overexpression of both HER4, which is a member of EGFR family and NRF2 are reported in ovarian cancer and studies have implicated both NRF2 and HER family in resistance of numerous cancers to chemotherapeutic agents. Human ovarian cancer cell lines, OVCAR3 and OVCAR4 were maintained in RPMI 1640 media supplemented with 10% foetal bovine serum (FBS) and 1% pen/strep in 5% CO_2 and incubated at 37°C. Before experimental treatments, cells were grown for 24 h in RPMI 1640 media and then treated with either tert-Butylhydroquinone (tBHQ; Sigma) or Ginger (*Zingiber officinale*) (Carbosynth) to a final concentration as required with media. Following this, Dual luciferase assay, cytotoxicity assay, ROS detection, Glutathione assay and immunoblotting were performed in this study.It demonstrated that Ginger (*Zingiber officinale*) inhibited the NRF2 activity, which led to downregulation of HER4 protein

expression and decreased cell growth of OVCAR3 and OVCAR4 cells. Additional investigation revealed that Ginger (*Zingiber officinale*) could lead to transcriptional inhibition of HER4 promoter activity by inhibiting the NRF2 activity in the HER4 promoter region. Furthermore, inhibition of NRF2 led to increase in ROS level and depletion of total glutathione in all the cell lines. Taken together, these data suggest that Ginger *(Zingiber officinale)* may inhibit the cell growth of ovarian cancer cells through NRF2-mediated downregulation of HER4 expression and could be a novel avenue Ginger *(Zingiber officinale*) induced NRF2 inhibition, which lead to inhibition of cancer cell growth.
Key words: Ginger (*Zingiber officinale*), NRF2, HER4, Glutathione, ROS, Cytotoxicity

NSBMB/UPH/MB/092

ER Retention Motifs And Expression Systems Affect Glycosylation Of Alpha Amylase And Protein Properties *In Planta*

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ABSTRACT

Starch liquefaction and saccharification are key processing steps in the bioethanol industry. The rate-limiting α-amylase plays an important role due to its endo-glycosidic activity. This work focused on ER retention to boost recombinant expression of barley α-amylase *in planta* and purification of the protein. A glycan mutant of the α-amylase was generated by site-directed mutagenesis. This involved a point mutation on the barley α-amylase where a single amino acid substitution that is asparagine residue was mutated to serine (N372-S372). Amylase was also fused to the ER retention motif, HDEL, EDDHDEL and the C-terminus of calreticulin. The DNA was cloned, plasmids were generated and transiently expressed in protoplasts. To increase recombinant protein levels in plants, naked DNA transfer in protoplast was replaced by Agrobacterium-mediated gene transfer in infiltrated leaf section, as the method results in transformation of the majority of cells in an infiltrated region. Although α-amylase and short amylase fusions such as amylase HDEL are not glycosylated in protoplasts or infiltrated leaf epidermis cells, it cannot be ruled out that glycosylation may yet take place in transgenic plants. Results obtained generated evidence for context-dependence of the ER retention motif HDEL, the existence of an HDEL-independent ER retention mechanism and quantitative data showing toxicity or detrimental effects of HDEL overdose. Results also revealed an effect of peptide tags on N-linked glycosylation as well as evidence that expression levels and systems can strongly affect glycosylation of proteins in the secretory pathway.

Key words: ER, α-amylase, glycosylation

NSBMB/UPH/MB/093

Biochemical Changes In Lipid Profile And Antioxidant Status In Pregnancy

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ABSTRACT

Foetal development throughout pregnancy, as well as the consequences of delivery, are related to maternal lipid profile and antioxidant status. However, some findings have shown that changes in lipid profile and antioxidant status play a major role in pregnancy outcome. This study was carried out as a result of reported cases of increased pregnancy miscarriages (abortion), pregnancy induced hypertension, preeclampsia, and gestational diabetes especially among women in their second and third trimester. 50 women were recruited from two Primary Healthcare facilities at Akure, where 25 pregnant women (who served as subjects) with normal pregnancy and 25 non-pregnant women in their reproductive ages (served as control). Lipid profile (Low density lipoprotein-LDL, High density lipoprotein-HDL, Total cholesterol-TC, Triacylglycerol-TAG), antioxidant status (Glutathione peroxidase activity- GPx), lipid peroxidation (Malondialdehyde-MDA) were determined using analytical test-kits from the blood samples collected. The results showed a significant increase ($p < 0.05$) in lipid parameters: LDL, TAG, TC and HDL in subjects when compared to the control group. GPx activity was significantly increased ($p < 0.05$) in the subjects when compared to the control group. MDA level was also shown to be significantly increased in subjects than in control group. Fasting blood sugar (FBS) was also significantly ($p < 0.05$) higher in non-pregnant control group when compared with subjects (pregnant group). This research suggests that there is a need to monitor the lipid profile and antioxidant status of pregnant women in order to improve pregnancy outcome and reduce the incidence of pregnancy loss.

Key words: - Lipid profile, Pregnancy, Antioxidant, Peroxidation, miscarriage, abortion

NSBMB/UPH/MB/094

Biochemical evaluation of the preclinical efficacy of *Vitex simplicifolia* roots synthesized silver nanoparticles against oxidative and hepatic impairment in diabetic rats

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ABSTRACT

The unprecedented increase in diabetes mellitus (DM) and its complications is becoming an epidemic disease, accompanied by a high mortality rate globally. Regrettably, most conventional drugs are insufficient due to their toxicity and poor bioavailability. This research assessed the anti-diabetic effects of ethanol extract and silver nanoparticles (AgNPs) of *Vitex simplicifolia* roots. *The AgNPs were characterized* using UV, FTIR, and SEM techniques. Thirty albino rats of both sexes were randomized into six experimental groups (n = 7). Alloxan monohydrate (150 mg/kg body weight (b.w.)) was the β-cell toxicant used to induce DM in groups 2–6, while group 1 served as the baseline. The rats in groups 2–6 received normal saline, 5 mg/kg b.w. Glibenclamide (a standard drug), 300 mg/kg b.w. ethanol extract of *V. simplicifolia* (EEVS), 300 mg/kg b.w. AgNPs, and 150 mg/kg b. w. of EEVS + 150 mg/kg b.w.

AgNPs orally, respectively, for 21 days. The biochemical indices of oxidative stress were assessed from the rat's serum. The AgNPs had a strong absorption peak at 459nm and a particle size of 17.20 nm. The elevated glucose levels in untreated group 2 (310 mg/dL) were significantly ($p < 0.05$) reduced in groups 3-6 following treatment to 106, 105, 98, and 116 mg/dL, respectively. The treatment also increased the activities of superoxide dismutase, catalase, and reduced glutathione while reducing the liver markers and levels of MDA relative to the untreated diabetic rats. However, treatment with the AgNPs elicited more anti-diabetic action than the ethanol extract. The results of this study strongly suggest that *V. simplicifolia* AgNPs could be very useful for halting diabetes and its associated complications.
Keywords: Antioxidants; diabetes; lipid peroxidation; nanoparticles; *Vitex simplicifolia.*

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The Radical Scavenging, Inhibition Of A-Amylase And A-Glucosidase, And Phytoconstituents Of Solvent Fraction Of *Tapinanthus Bangwensis*.

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ABSTRACT

The exploration of medicinal plants for therapeutic purpose is occasioned by the quality and quantity of its phytoconstituents to exacerbate potent bioactivity, however, there is the need for further exploit. The study assessed the radical scavenging and in vitro antidiabetic effect, and including identifying the likely chemical compounds present in the solvent fraction (HEX-ETACF or CF 2) of *Tapinanthus bangwensis*. The extraction was carried out using column chromatography, while the GC-MS machine and spectrophotometer were used to elucidate the phytoconstituents, and the antioxidant and antidiabetic effect respectively. The percentage yield of the fraction was 8.21%, while the antioxidant results had the activity of lipid peroxy, 2,2-diphenyl-1-hydrazyl and nitrite radicals significantly inhibited compared to the ferric radicals. Furthermore, the metabolic activity of α-amylase was inhibited compared to the α-glucosidase. The Fourier transition infrared (FTIR) chromatogram revealed that the fraction contains complex molecules, with methyl, carboxyl, carbonyl, and aromatic groups possibly linked to them. The GC-MS chromatogram had twenty-one peaks, with butyl-9-octadecenoic acid (8.01%) and nonahexacontanoic acid (0.05%), representing the highest and lowest percentage areas (% area). Another GC-MS chromatogram had twenty-seven peaks, with squalene (peak 23; 37.29%) and 1,2-benzenedicarboxylic acid, buty-2-ethylhexyl ester (peak 27; 19.87%) been well concentrated, suggested the fraction was rich in phenolics and phthalates. Our findings demonstrated that the compounds had beneficial effects as antioxidant and antidiabetic agents.
Keywords: *Tapinanthus bangwensis,* Antioxidant, Anti-diabetic, Fourier transition infrared (FTIR), Gas chromatography-mass spectroscopy (GC-MS).

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Methanol Extracts Of *Ocimum gratissimum* Attenuates Liver Glycogen, Serum And Intestinal Amylase Activities In Normoglycemic Rats.

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ABSTRACT

Type 2 diabetes is almost becoming the world's most significant cause of morbidity and mortality. This form of diabetes frequently goes undiagnosed for many years because hyperglycemia develops gradually. Therefore in order to prevent diabetic complications as well as reduce the costs of medical care, early detection, diagnosis, and early treatment becomes imperative. The effect of oral administration of methanol extracts of *Occimum gratissimum* on antihyperglycemic potential of the leaves in albino rats was investigated. Twenty-four albino rats aged 7-10 weeks old were used in the study and were assigned into four groups: High dose *O. gratissimum* (500mg/kg bw), low dose *O. gratissimum* (250mg/kg bw), Metformin (300mg/kg bw) and control. At the end of the study which lasted for 28 days, the animals were fasted overnight, sacrificed and blood collected. Biochemical assays using standard methods were carried out to determine liver glycogen, serum and intestinal amylase activities. Results showed that there was significant difference in the liver glycogen concentration of the control and the group administered 500mg/kg bw of *O. gratissimum*. There was significant decrease in the serum amylase activity between the 500mg/kg, 250mg/kg *O. gratissimum* and the control. Intestinal amylase activity also differed significantly between the 500mg/kg *O.gratissimum* and the control group. These results indicate that oral administration *O. gratissimum* at the doses administered could lower blood glucose concentration and may be useful in the management of diabetes mellitus as well as other disorders associated with hyperglycaemia.

Keywords: Type 2 diabetes *O. gratissimum* Intestinal amylase

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Haematological evaluation and Antiplasmodial Activity of Fractions and Ethanolic Extract of *G. latifolium* in *Plasmodium berghei* infected albino mice

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ABSTRACT

This study investigated the antiplasmodial activity: suppressive, prophylactic and curative effect of GL leaves extract and fractions namely n-HEX (n-hexane fraction), ETOAC (Ethyl acetate fraction), AQF (Aqueous fraction), ACET (Acetone fraction) and ETOH (Ethanol extract), on the haematological parameters of *P. berghei* infected mice. A total of 157 mice were grouped into 3 main assemblages for a prophylactic, suppressive and curative antiplasmodial study. They were further divided into 7 groups for prophylactic and suppressive treatments and 8 groups for the curative treatment. The groups were named as follows: MC (Malaria control), ACT (Positive control), NC (Normal control) and fractions namely ETOH (Ethanol fraction) n-HEX (n-Hexane fraction), ACET (Acetone fraction), ETOAC (Ethyl acetate fraction), and Aqueous fraction (AQF). All the treatment batches obtained 500mg/kg body weight (bw) of the respective extract/fractions. The MC were given coartem (10mg/kg/day bw) and the NC group which were for curative received distilled H_2O (10 ml/kg bw) orally. Treatment with *GL* in their different vehicles started after the parasites were induced, for an additional period of 4 days. This represented the curative model. For the suppressive group, different vehicles of GL extract were administered 30 minutes after the mice had been induced. This process took four days. The various GL vehicle forms were administered to the mice for three days consecutively before induction of the malarial parasites; this therefore constituted the prophylactic method. Later, Mean Survival Time (MST) and density of blood parasite were determined for the prophylactic, curative and the suppressive groups. For haematological analysis, the curative group of animals were considered. The results showed that the ethanol extract and its fractions significantly ($p<0.05$) reduced the parasitaemia level in all three models. The degree of anti-plasmodial activity was highest in the prophylactic group while ACET group showed the highest chemo-suppressive potency of 93.48% compared to the other treatment groups. In the suppressive model, the ethyl acetate fraction exerted the highest chemo-suppressive effect of 80.09%. The findings further revealed that haematological indices were altered by the high parasitaemia level which was also significantly ($p<0.05$) reduced, compared to the MC.

Keywords: *Gongronema latifolium, Plasmodium berghei,* Haematological, Ethanol fractions, Antiplasmodial.

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Glypican-3 Dependent Protein Regulation In Hepatocellular Carcinoma And The Potential Role In Cancer Chemoprevention

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ABSTRACT

The suppression of GPC-3 expression by 6-G culminated in the decreased expression seen in GPC-3 dependent genes resulting in hepato-protection in DEN+2AAF-challenged mice. Hepatocellular carcinoma (HCC) is one of the world's most lethal cancers and third among all cancer-related mortalities. With staggering incidences in Sub-Saharan Africa. Natural dietary products have shown strong promising potential in the management and prevention of cancer. [6]-gingerol (1-[4′-hydroxy-3′- methoxyphenyl]-5-hydroxy-3-decanone), a phenolic compound from ginger (*Zingiber officinale*) possesses chemoprotective properties against hepatocarcinogenesis in animal models. This study aimed at investigating the molecular mechanisms underlying the chemotherapeutic potentials of [6]-gingerol on diethylnitrosamine-

initiated and 2-acetylaminofluorene-promoted hepatocellular carcinoma in mice. Inflammation was evaluated by measuring the levels of IL-1β, IL-6, TNF-α, and the expressions of NF-κβ, and COX-2. By stimulating the accumulation of mutations and recruiting other important inflammatory mediators, TNF- plays a crucial part in cellular transformation or tumor development. Therefore, drugs that inhibit these proinflammatory proteins have shown promise as therapeutics. We observed that [6]-gingerol inhibited HCC-induced activation of the wnt signaling pathway, one of the signaling involved in development and it has been shown to activate some oncogenes and cell cycle genes which can lead to uncontrolled proliferation of new cells, and exerted anticancer activity via abrogation of glypican-3, c-Myc, TGF-β, HIF and VEGF-A expressions.With strong evidence, 6-GR exhibited potent anticancer potentials against DEN and 2AAF-induced hepatocellular carcinoma by inhibiting the glypican-3 pathway and associated proteins.

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Gastroprotective Activity Of Extract Of *Spondias Mombin* In Aspirin-Induced Gastric Mucosal Injury In Wistar Rats: A Possible Involvement Of H_2 Receptor Inhibition

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ABSTRACT

Spondias mombin is used in folk medicine for the treatment of inflammation and gastrointestinal diseases. This study entailed a preliminary phytochemical screening of the extract by High-Performance liquid Chromatography, gastro protective effect of the extract by aspirin-induced gastric lesions model and molecular docking studies of the phytochemicals characterized from the extract were carried out on histamine receptors. The plant was abundant in flavonoids, tannins, saponins, phenols, alkaloids, and terpenoids, as shown by the HPLC fingerprint of the extract. The acute toxicity assessment of the extract revealed LD50 values larger than 5,000 mg/kg body weight. The results obtained from the gastroprotective study revealed that aspirin caused severe gastric mucosa damage, as evident by marked increase in ulcer score, ulcer index, lipid peroxidation, Tumor necrosis-alpha (TNF-α), Interleukin-1β (IL-1β), and significant decreased gastric antioxidant status, prostaglandin-E_2 (PGE_2) levels at $p < 0.05$. But, pretreatment with *S. mombin* and misoprostol significantly reduced the formation of ulcers and remarkably improved these biochemical parameters. Furthermore, *in* silico results revealed that rutin had the highest binding affinity and excellent interactions with Histamine receptor. These results validate the traditional claims of using *S. mombin* to treat peptic ulcer disease.

Keywords: *Spondias mombin,* gastroprotective, extract, docking, aspirin

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Effects Of Feed Fortified With Processed *Arachis Hypogaea* On Lactate Dehydrogenase, Lipid Peroxidation And Random Blood Glucose Level Of Wistar Rats

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ABSTRACT

Arachis hypogaea is an important legume nut known for its multifarious uses, including oil production, direct human consumption as food and animal consumption in the form of hay, silage and cake. This study is aimed at identifying the effect of feed fortified with processed *A. hypogaea* on the lactate dehydrogenase, lipid peroxidation, and random blood glucose levels of Wistar albino rats. Thirty-five rats were randomized into seven groups (A-G) of five rats each. Group A served as the normal control while Group B to Group G were fed different percentages of standard feed mixed with different percentage of cooked, uncooked, and grilled *Arachis hypogaea* (groundnut) for 28 days. The random blood glucose concentrations were taken weekly using a one-touch glucometer, while the lactate dehydrogenase, and lipid peroxidation levels were determined using Randox diagnostic test kits at the end of the 28 days. The result gotten from the research showed that the various forms of processed *A. hypogaea* had no significant effect ($p>0.05$) on both lactate dehydrogenase, and lipid peroxidation levels of wistar albino rats. There was a significant increase ($p<0.05$) in week 1, week 2 and week 4 in the random blood glucose levels of groups fortified with 70% standard feed + 30% cooked/uncooked/grilled *A. hypogaea*; 50% standard feed + 50% cooked/uncooked/grilled *A. hypogaea and* 100% standard feed (normal control) when compared to week 0. The study's findings, however, point to no increased risk of cardiovascular disease or damage to cell membranes from feed fortified with cooked, uncooked, or grilled *A. hypogaea* on lipid peroxidation or lactate dehydrogenase. However, they also suggest that caution should be applied when using grilled *A. hypogaea* because it exhibits hyperglycemic properties, which could raise blood glucose levels if not consumed in moderation.

Keywords: *A. hypogaea, c*ooked groundnut, lactate dehydrogenase, lipid peroxidation, grilled groundnut, blood glucose, uncooked groundnut.

NSBMB/UPH/MB/101

Dehydrogenase, Lipid Peroxidation And Random Blood Glucose Effects Of Feed Fortified With Processed *Arachis Hypogaea* On Lactate Level Of Wistar Rats

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ABSTRACT

Arachis hypogaea is an important legume nut known for its multifarious uses, including oil production, direct human consumption as food and animal consumption in the form of hay, silage and cake. This study is aimed at identifying the effect of feed fortified with processed *A. hypogaea* on the lactate dehydrogenase, lipid peroxidation, and random blood glucose levels of Wistar albino rats. Thirty-five rats were randomized into seven groups (A-G) of five rats each. Group A served as the normal control while Group B to Group G were fed different percentages of standard feed mixed withdifferent percentage of cooked, uncooked, and grilled *Arachis hypogaea* (groundnut) for 28 days. The random blood glucose concentrations were taken weekly using a one-touch glucometer, while the lactate dehydrogenase, and lipid peroxidation levels were determined using Randox diagnostic test kits at the end of the 28 days. The result gotten from the research showed that the various

forms of processed *A. hypogaea* had no significant effect ($p>0.05$) on both lactate dehydrogenase, and lipid peroxidation levels of wistar albino rats. There was a significant increase ($p<0.05$) in week 1, week 2 and week 4 in the random blood glucose levels of groups fortified with 70% standard feed + 30% cooked/uncooked/grilled *A. hypogaea*; 50% standard feed + 50% cooked/uncooked/grilled *A. hypogaea and* 100% standard feed (normal control) when compared to week 0. The study's findings, however, point to no increased risk of cardiovascular disease or damage to cell membranes from feed fortified with cooked, uncooked, or grilled *A. hypogaea* on lipid peroxidation or lactate dehydrogenase. However, they also suggest that caution should be applied when using grilled *A. hypogaea* because it exhibits hyperglycemic properties, which could raise blood glucose levels if not consumed in moderation.

Keywords: *A. hypogaea, c*ooked groundnut, lactate dehydrogenase, lipid peroxidation, grilled groundnut, blood glucose, uncooked groundnut.

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Effect Of Some Commonly Consumed Food Additives On Haematological Indices And Lipid Profile Of Wistar Rats

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ABSTRACT

Haematological indices and lipid profile of Wistar rats fed diets supplemented with two food additives (Knorr cubes and Mr. Chef's fried rice seasoning) were assessed. Forty nine (49) Wistar rats of average weight of 110 ± 30g used in the study were divided into seven (7) groups of seven (7) rats each. The groups were the control (fed normal rat chow) and groups fed 2%, 4% and 8 % Knorr cubes and 2%, 4% and 8 % Mr. Chef's fried rice seasoning supplemented with the corresponding normal rat chow. Water and food were allowed *ad libitum* to all the groups. At the end of 28 days of feeding, body weight changes, relative organ weights, full blood count, as well as total cholesterol (TCHOL), high density lipoprotein (HDL), triacylglyceride (TAG), very low-density lipoprotein (VLDL) and low density lipoprotein (LDL) were determined. The results, showed no changes in total cholesterol, high density lipoprotein, triacylglyceride, very low density lipoprotein and, an increase in low density lipoprotein concentration in the different supplemented portions of Knorr cubes and decreased level of total cholesterol, triacylglyceride and very low density lipoprotein and no changes in high density lipoprotein and very low density lipoprotein in the different supplemented portions of Mr. Chef's fried rice seasoning. There were no changes in white blood cell, eosinophil and basophils contents in both groups fed supplemented diet with Knorr cubes and Mr. Chef's fried rice seasoning; there was an increase in leucocytes and monocyte in groups fed graded portions of Knorr cubes and Mr. Chef's fried rice seasoning respectively and a decrease in neutrophils in Knorr cubes fed group while in Mr. Chef's fried rice seasoning fed group, there was no change in neutrophils count. There were no changes in red blood cell, haemoglobin, mean corpuscular volume, and mean corpuscular haemoglobin in both Knorr cubes and Mr. Chef's fried rice seasoning fed groups, but an increase in packed cell volume, red blood cell distributions in both Knorr cubes and Mr. Chef's fried rice seasoning and a decrease in mean corpuscular haemoglobin concentration in both Knorr cubes and Mr. Chef's fried rice seasoning fed groups were observed.

Keywords: Food additives, Knorr cubes, Mr. Chef's fried rice seasoning, haematology, lipid profile

NSBMB/UPH/MB/103

Extract fractions of *Eremomastax Speciosa* attenuated fructose-fed and Streptozotocin-induced type II diabetic and its associated complications in an experimental rat model

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ABSTRACT

Type II diabetes mellitus (T2DM) is a metabolic disorder characterised by insulin resistance, hyperglycemia, and impaired glucose tolerance. This study evaluated the therapeutic potential of extract fractions derived from *Eremomastax Speciosa* (*E. Speciosa*) in alleviating fructose-fed and streptozotocin-induced type II diabetes and its associated complications using an experimental rat model. Induction of type 2 diabetes was through the administration of 10% fructose/40 mg/kg body weight streptozotocin (STZ). The diabetic animals were treated with extracts fractions (methanol and ethyl acetate) of *E. Speciosa* (50, 100 and 200 mg/kg body weight) twice daily for 21 days, in addition to metformin (MET: 500 mg/kg body weight) control orally through gastric intubation. The administration of E. Speciosa and MET extracts reduced fasting blood glucose with a gradual increase in body, liver and kidney weights. Also, an increase in anti-lipidemic activity, testosterone and estradiol levels was observed compared to the DC group. A dose-dependent significant change (increase and decrease) in mRNA expression of cytochrome e p45041, acyl-CoA oxidase, metallothionein, peroxisome proliferator-activated receptors, sterol regulatory element-binding protein 1 liver x-receptor, retinoid x receptor, fatty acid synthase, estrogen receptor-1, insulin-responsive glucose transporter, *leptin*, proprotein convertase subtilisin/kexin type 9 serine protease, cardiac troponin was observed compared to the control. Also, markers of inflammations, antioxidant activity and lipid peroxidation level were reduced. Our results indicate that *Eremomastax speciosa* extract fractions ameliorated hyperglycemia, insulin resistance, oxidative stress, and diabetic complications in the experimental rat model, suggesting its potential as a natural remedy for T2DM management.

Keywords: *Eremomastax speciosa*, type II diabetes mellitus, fructose-fed, streptozotocin, rat model, diabetic complications

NSBMB/UPH/MB/104

A Review on the Biochemistry of Drug Metabolism

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ABSTRACT

Drug metabolism is a crucial process in the fields of pharmacology and biochemistry. It involves the conversion of medicinal chemicals in the body to aid in their removal. The liver is the primary site of drug metabolism, where enzymes incorporate reactive or polar groups into drug molecules. Drug-metabolizing enzymes (DMEs) play a vital role in the breakdown of foreign substances in the body. They facilitate the transformation of prodrugs into their active state, hence enhancing their pharmacological efficacy. Drug-metabolizing enzymes (DMEs) are classified according to their specific mechanisms of drug metabolism, which may involve oxidative, reductive, and/or conjugative enzymes. These enzymes possess bio-activation routes and particular mechanisms of action to carry out their functions. The drug metabolism process involves the classification of metabolic reactions into either phase I or phase II reactions. In this review a comprehensive explanation of xenobiotic metabolism, including how drugs function. The important biochemical characteristics and catalytic processes are detailed, along with a vast assortment of hydrolases and their nomenclature. The disciplines of medicine, toxicology, and environmental science are illustrated through several instances. The investigated mechanisms involve the hydrolysis of a range of unstable rings, such as carboxylic esters, amides, peptides, lactones, and esters generated by inorganic acids. The book provides an explanation of the enzymology and procedure involved in hydrating epoxides.

Keywords: Drug metabolism, Enzyme, Biochemistry, Pharmacology, Xenobiotics

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The Potential Of *Anthocleista Vogelii* As A Natural Remedy For Reversing Oxidative Stress-Induced Anaemia

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ABSTRACT

Anthocleista vogelii, commonly known as cabbage tree or "apo oro or sapo" in Yoruba, “mpoto” Igbo and “kwari” Hausa, has historically been utilized in the treatment of malaria, hypertension, and other ailments. Phenylhydrazine, known for inducing membrane damage through the generation of free radicals, was used to induce anaemia in forty-five male *Wistar* rats. The rats were divided into five groups: two serving as normal and negative controls (A and B), and the remaining three as test groups. Anaemia was successfully induced in the test animals through intraperitoneal administration of 40 mg/kg phenylhydrazine for two consecutive days with a 24-hour interval. Methanol extracts *of Anthocleista vogelii* leaves were administered to the test groups at concentrations of 200 mg/kg (group C), 400 mg/kg (group D), and 600 mg/kg (group E). Haematological parameters were assessed using a haematology auto-analyzer. Following administration of the plant extract, haemoglobin, red blood cell (RBC) and packed cell volume (PCV) concentrations increased in a dose-dependent manner. White blood cell (WBC) counts also responded positively to treatment. Haemoglobin concentration for group A was 13.40 ± 0.46 (g/dl), group B 8.57 ± 0.57 (g/dl), group C 10.43 ± 0.59 (g/dl), group D 10.93 ± 0.55 (g/dl) and group E 11.30 ± 0.53 (g/dl). Group A had RBC concentration of 3.67 ± 0.15 (10^6/µL), group B 2.30 ± 0.20 (10^6/µL), group C 2.90 ± 0.20 (10^6/µL), group D 3.03 ± 0.15 (10^6/µL) and group E 2.98 ± 0.13 (10^6/µL) while PCV values

for group A was 39.67 ± 1.53%, group B 25.33 ± 1.53 %, group C 31.00 ± 1.73%, group D 32.33 ± 1.52% and group E 33.33 ± 1.53 %. White blood cell (WBC) for group A was 7.33 ± 0.65 (10^3/µl), group B 17.70 ± 0.70 (10^3/µl), group C 15.07 ± 0.97 (10^3/µl), group D 16.33 ± 1.06 (10^3/µl) and group E 15.87 ± 1.50 (10^3/µl). The results suggest the potential of *Anthocleista vogelii* as a natural remedy for reversing oxidative stress-induced anaemia.

Keywords: Anaemia, Phyto-medicine, oxidative stress, *Anthocleista vogelii*

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Partial Purification And Characterization Of Polyphenol Oxidase From *Dioscorea dumentorum* Tuber

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ABSTRACT

This study sought to purify and characterize Polyphenol oxidase (PPO) enzyme from *Dioscorea dumentorum* tuber. The tuber was obtained from Abia State. The enzyme from *D. dumentorum* tuber was extracted and purified through ammonium sulfate $(NH_4)_2SO_4$ precipitation, dialysis, and gel filtration chromatography. The enzyme activity was spectrophotometrically determined using L-3, 4-dihydrophenylalanine (L-DOPA) as substrate. The molecular weight of the enzyme was determined by SDS-Polyacrylamide gel electrophoresis. The physicochemical properties such as pH, temperature, substrate specificity, and kinetic constants -Vmax and Km for four substrates L-DOPA, Catechol, Tyrosine and Gallic acid were determined spectrophotometrically. Thermal inactivation kinetics and inhibitory studies on PPO activity were also investigated. Fold purifications of 93.11 with 6.39% yield were obtained for *D. dumentoru*m after the last stage of purification. A 15 kDa molecular weight was obtained in the plant. The optimum pH value for *D. dumentorum* was found to be 7.0 while the optimum temperature was 50^{o}C. Inhibition studies showed dose-dependent inhibitory effects by inhibitors such as L-Cysteine, Ascorbic acid, Citric acid and Phytic acid. From the thermal inactivation kinetics, the $t_{1/2}$ values obtained at 90^{o}C were 18.48 min for PPO from *D. dumentorum* indicating high thermostability. Consequently, the data obtained in this study provided insight into the utilization of *D. dumentorum* tuber as a source of Polyphenol oxidase for industrial purposes.

Keywords: PPO; SDS-Polyacrylamide gel electrophoresis; L-3, 4-dihydrophenylalanine

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Effect Of Ethanol Leaf Extract Of *Moringa Oleifera* On D-Galactose Induced Changes In Liver Function Markers Of Wister Albino Rats

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ABSTRACT:

The aging process is linked to several morphological and functional modifications in the liver. Thus, understanding the mechanisms underlying age-related liver susceptibility and possible

therapeutic treatment is very crucial. To examine the serum liver enzymes in Wister albino rats, this study employed D-galactose- induced aging as a model. The liver enzymes were analysed using standard methods. Thirty (30) male albino rats were randomly assigned into five (5) groups of six (6) animals each and fed with normal diets. Group 1 and 5 which served as the young and adult control received basal diet only while the others were administered D-galactose (150mg/kg) and *Moringa oleifera* extract (MOLE-200mg/kg &- 400mg/kg) respectively for eight (8) weeks. At the end of the study animals were sacrificed and blood sample were collected. At week 2, results showed that treatment with high dose (HD) of MOLE resulted in a significant ($p<0.05$) decrease in Bilirubin and ALT concentration relative to the D-galactose only treated group. At week 8, treatments with HD and LD of MOLE resulted in a significant ($p<0.05$) decrease in AST, ALT, ALP and Bilirubin concentration relative to the D-galactose only treated group, Conversely, Total protein concentration was significantly ($p<0.05$) increased following treatment with both HD and LD of MOLE relative to the D-galactose only treated group. These results suggest that *Moringa oleifera* leaf extract exerts some protective interventions against age-related liver dysfunctions.

Keywords: Ageing, D-galactose, liver enzymes and *Moringa oleifera* leaf extract.

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Effect Of *Tapinanthus globiferus* On Sodium Arsenite-Induced Toxicity In *Drosophila melanogaster*

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ABSTRACT

This study investigated the ameliorative effects of *Tapinanthus globiferus* against sodium arsenite-induced toxicity in *Drosophila melanogaster*, a plant historically used in traditional medicine. Three fractions of *T.globiferus* (butanol, methanol and ethyl acetate) were obtained from methanolic crude extract of the leaf. Mixed sex of Canton S *D.melanogaster* were divided into different groups: control, sodium arsenite-exposed, *T.globiferus*-treated only and sodium arsenite-exposed and treated. Each group with five vials, had fifty flies. Sodium arsenite induced toxicity and ameliorative effects of the three fractions of *T.globiferus* were evaluated using biochemical assays of reduced glutathione(GSH), glutathione-s-transferase (GST) and acetylcholinesterase (AChE) activities, total thiol(TSH), hydrogen peroxide and lipid peroxidation (MDA concentration) as well as mRNA expression of *SOD1* and *CNC*. To investigate potential therapeutic mechanism, bioactive molecules from *T.globiferus* were docked against NADPH oxidase (PDB ID:8WEJ). Results showed significant decrease in GSH ($p=0.0003$) and TSH ($p=0.029$) levels following sodium arsenite exposure. There was also a significant decrease in the activities of GST ($p=0.036$) and AChE ($p=0.0007$). There was significant increase in hydrogen peroxide ($p=0.0007$) and MDA ($p=0.0003$) concentrations. These were all ameliorated by the three fractions of *T.globiferus. SOD1* was downregulated and *CNC* was overexpressed by sodium arsenite, which was reversed by the fractions. Molecular docking result showed that rutin (-11.633 kcal/mol) and isoquercetin (-9.583 kcal/mol) had higher scores compared with the standard NADPH oxidase inhibitor-Diphenyleneiodonium (-3.697 kcal/mol). The study showed that *T.globiferus* can ameliorate

the harmful effects of sodium arsenite biochemical indices in fruit flies, potentially revealing insights into its medicinal potential.

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Potential Antiobesity And Antioxidant Effect Of *Diospyros Mespiliformis* Leaf Extracts

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ABSTRACT

Among the underutilized plants in Nigeria, *Diospyros mespiliformis* dominated northern Nigeria It is presently gaining the attention of researchers due to its phytochemical contents. The aim of this study was to evaluate the antiobesity and antioxidant potentials of Bauchi grown *Diospyros mespiliformis* leaf extracts. The leaves were air dried, grounded into fine powder and extracts of aqueous, 50%, 60%, 70% and 100% ethanol were prepared. The pancreatic lipase, α-glucosidase, α-amylase inhibition, DPPH radical scavenging and metal chelating activity assays, total phenolics content (TPC) and total flavonoids content (TFC) were evaluated using standard methods. The result indicated that the lipoprotein lipase inhibition of 100% ethanol extract with the IC_{50} value of 82.48 ± 8.21 µg/mL was the highest among the leaf extracts, followed by that of aqueous extract (127.66 ± 18.76 µg/mL), while that of 60% extract was the lowest (484.87 ± 17.68 µg/mL). The IC_{50} value (0.71 ± 0.09 µg/mL) for α-glucosidase inhibition was highest in 70% ethanol extract while that of 50% extract (3.17 ± 0.16 µg/mL) was the lowest. The 70% ethanol extract also gave the highest α-amylase inhibition with the IC_{50} value of 5.96 ± 0.82 µg/mL. The leaf extracts showed more inhibitory potentials against α-glucosidase than α-amylase activity. The 50% ethanol leaf extract produced the strongest metal chelating activity with the IC_{50} value of 0.92 ± 0.03 µg/mL, while the DPPH radical inhibition for the 100% ethanol leaf extract was the highest with the IC_{50} value of 14.11 ± 0.68 µg/mL. The 100% ethanol extract also presented the highest total phenolics content (TPC) and total flavonoids contents (TFC) with the values 554.05 ± 87.42 mg GAE/g and 47.61 ± 15.72 mg QE/g respectively. With these bioactive potentials presented by *D. mespiliformis* leaf, the plant is capable of becoming a potential focus for antiobesity lead molecule.

Key Words: *Diospyros mespiliformis*, lipoprotein lipase, α-glucosidase, α-amylase activity and antiobesity.

NSBMB/UPH/MB/110

Diphenyl diselenide ameliorates the neurotoxic effect of diesel exhaust particles in wistar rats

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ABSTRACT

Dipheny diselenide, an organoselenium compound, has been reported to possess pharmacological property. Air particulate matter as exemplified by diesel exhaust particles has oxidative, inflammatory, and apoptotic effects as reported in many experimental models, This research aims to investigate the impact of diphenyl diselenide (DPDSe) on the redox status, inflammatory response, and expression of redox-sensitive genes in neurotoxicity induced by diesel exhaust particle in male albino rats. Male Wistar albino rats received nasal administration of DEP at doses of 30 and 60 µg/kg, along with intraperitoneal treatment of 10 mg/kg DPDSe. The study assessed both non-enzymatic (lipid peroxidation and conjugated diene concentrations) and enzymatic (catalase, superoxide dismutase, glutathione peroxidase) antioxidant levels and the activity of acetylcholinesterase enzyme in the rats' brain tissues. Additionally, the expression of genes associated with oxidative stress (HO-1, Nrf2), pro-inflammatory (NF-KB, IL-8, TNF-α), anti-inflammatory (IL-10), and brain-specific (GFAP, ENO-2) functions was analyzed. The findings revealed that DPDSe significantly ($p<0.05$) reduced the elevated levels of thiobarbituric acid reactive substances and conjugated dienes observed in the brains of DEP-exposed rats. Moreover, DPDSe reversed the decreased activities of catalase, superoxide dismutase, and glutathione peroxidase enzymes in the brains of DEP-exposed rats. Furthermore, DPDSe mitigated the downregulation of genes associated with redox homeostasis, anti-inflammatory response, and brain-specific functions, while also attenuating the upregulation of pro-inflammatory genes observed in the DEP-treated groups. These results suggest that DPDSe promptly restores altered biochemical conditions and molecular expressions in the brains of DEP-exposed rats, highlighting its potential as a therapeutic candidate for alleviating neurotoxicity induced by DEP associated with oxidative stress.

Keywords: Diesel exhaust particle, diphenyl diselenide, redox, antioxidant, inflammation, glutathione peroxidase

NSBMB/UPH/MB/111

Curcumin Protects Against Diesel Exhaust Chemicals- Induced Hepato-Nephrotic Oxidative And Inflammatory Effects In Wistar Rats.

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ABSTRACT

This study evaluated the therapeutic efficacy of curcumin on the oxidative and pro-inflammatory effects of DEP in the liver and kidney of exposed male wistar rats. Diesel exhaust particle, collected from an Iveco cargo 75E17 vehicle at Ore Motor Park Ondo State, Nigeria, was extracted in methanol (mDEP). Thirty male wistar rats were divided into six groups and acclimatized before nasal exposure to the mDEP (30 and 60 µg/kg) for 2 weeks. Curcumin (20 mg/kg) was administered intraperitoneally for 14 days post-mDEP exposure. The impact of curcumin on selected genes associated with DEP-induced damage was assessed, including phase 1 activating pathway: aryl hydrocarbon receptor (AhR), aryl hydrocarbon receptor nuclear translocator (ARNT), antioxidant proteins: heme oxygenase-1 (HO-1) and nuclear

factor erythroid 2–related factor 2 (Nrf-2), inflammatory genes: interleukin-8 (IL-8), tumor necrosis factor-alpha (TNF-α), nuclear factor kappa B (NF-κB) and interleukin-10 (IL-10), and kidney injury marker (KIM-1). Molecular docking experiments were conducted to investigate the interaction between curcumin and the proteins encoded by these genes. The mDEP exposure significantly ($p<0.05$) increased the mRNA levels of pro-inflammatory cytokines with concomitant decreased in IL-10 level compared to the control. The mDEP also increased significantly the KIM-1, ARNT and AhR gene expressions. Post treatment with curcumin significantly ($p<0.05$) reversed all the effects of mDEP in the exposed rats. In silico studies revealed the detrimental effects of mDEP and demonstrated the therapeutic efficacy of curcumin via molecular docking experiments. These findings highlight the potential of curcumin as a therapeutic agent against oxidative stress and inflammation induced by mDEP in the liver and kidney of exposed rats.

Keywords: diesel exhaust particles, curcumin, oxidative stress, inflammation, liver, kidney

NSBMB/UPH/MB/112

Haematological Derangement Of Typhoid Fever Patients In University Of Calabar Teaching Hospital, Cross River State

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ABSTRACT

Haematological analyses were carried out on eighty (80) volunteers at the University of Calabar Teaching Hospital. The volunteers were divided into four groups: twenty (20) subjects confirmed to be typhoid positive and have not started treatment (Pre-treatment group), twenty (20) confirmed to be typhoid patients on treatment, twenty (20) persons confirmed to have been cured of typhoid fever (Post-treatment group) and twenty (20) volunteers confirmed not to have had typhoid fever at all or had no other ailment by the time their blood samples were collected, (negative control). The result of the study revealed that the mean WBC of the pretreatment (3.61 ± 0.32) was significantly different from the mean WBC of the male normal control (2.41 ± 0.28). This results also showed significant increase in the mean concentrations of Neutrophils (53. 07 ± 2.17), Eosinophils (3.61 ± 0.32), Basophil (7.35 ± 0.39) of the pretreatment group of the male patients when compared with the control. Conversely the mean concentrations of HGB (2.85 ± 0.21) and RBC (1.8 ± 0.26) of the pretreatment groups were significantly lower than the mean concentrations of HGB (12.51 ± 1.04) and RBC (5.56 ± 0.22) of the control. Similarly, the study revealed significant difference in the mean concentration of the haematological parameters between the male in the pretreatment group WBC (3.61 ± 0.32) Neutrophile (53.0 ± 2.17), HGB (2.85 ± 0.21), Eosinophils (3.61 ± 0.32), Basophils (7.35 ± 0.39) and RBC (1.8 ± 0.26) when compared with the mean concentration of the females WBC (3.62 ± 0.31) Neutrophil, (55. 63 ± 1.64), HGB (2.89 ± 0.21), Eosinophil (3.62 ± 0.31), Basophils (6.85 ± 0.4) and RBC (1.38 ± 0.24). These results indicate heamatological changes during the progress of typhoid fever.

NSBMB/UPH/MB/113

Abatement of Potassium Bromate-induced Hepatorenal Toxicity and Altered Biochemical indices in Male Wistar Rats using Ethanol Leaf Extract of *Irvingia gabonensis*

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ABSTRACT

The renal toxicity associated with potassium bromate ($KBrO_3$) treatment in both animals and humans have been reported. *Irvingia gabonensis* a perennial plant belonging to the family *Irvingiaceae* is known to elicit beneficial health effects. However, the influence of *Irvingia gabonensis* on the renal and hepatotoxicity associated with $KBrO_3$ induced nephrone toxicity is unavailable in the literature. The current study evaluated the effects of *Irvingia gabonensis* on the dysfunctional renal and liver status triggered by KBrO3 exposure in rats. Experimental animals were exposed to $KBrO_3$ (50mg/kg), co-treated with *Irvingia gabonensis* (500 mg/kg) and (1000 mg /kg) for 14 days. Results revealed that *Irvingia gabonensis* treatment significantly assuaged $KBrO_3$-mediated oxidative-inflammatory response. Additionally, *Irvingia gabonensis* attenuated $KBrO_3$ -induced reduction in antioxidant enzyme activities and enhanced hepatic-renal function markers, namely aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP) and levels of urea and creatinine. *Irvingia gabonensis* efficiently mitigated $KBrO_3$-mediated increase in myeloperoxidase (MPO) activity, levels of interleukin-b (IL-6), Tumor necrosis factor (TNF-α) and interleukin-6 (IL-6) in kidney of rats. In conclusion, *Irvingia gabonensis* ameliorated deficits in the renal function in KBrO3-exposed rats by lowering the levels kidney function markers via diminution of oxidative-inflammatory stress.

Key words: Potassium Bromate, *Irvingia gabonensis*, Kidney, Histopathology, Oxidative stress, inflammatory stress.

NSBMB/UPH/MB/114

Abatement of Cyclophoshamide Instigated Oxidative Testicular Damage and Endocrine Depletion in Rats by Urtica dioca

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ABSTRACT

In this study, the toxic effect of cyclophosphamide (CP) on sperm morphology, testicular histology and oxidant–antioxidant balance, and protective roles of UD (Urtica dioca) was investigated. For this purpose, 25 healthy, adult, male wistar rats were divided into five groups; five animals in each group. The control group was treated with placebo, the disease control was treated with CYP 10mg/kg body weight, the remaining groups were treated with UD 1000mg/kg only, CYP 10mg/kg + UD 500mg/kg and CYP 10mg/kg + UD 1000mg/kg for 14days. At the end of the experiment period, all the groups were sacrificed. Hormone profile, morphological abnormalities of sperm, plasma malondialdehyde (MDA) levels and glutathione (GSH) levels, GSH-peroxidase (GSH-Px), catalase (CAT) and superoxide dismutase (SOD) activities in serum, and testicular histopathological changes were examined. CYP induced decrease in testicular activities of superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPx), and reduced glutathione (GSH) level, whereas levels of malondialdehyde (MDA) markedly increased and confirmed by histopathological alterations. Serum levels of testosterone, FSH and LH were considerably reduced. Co-treatment with UD, attenuated the biochemical changes in the testis, enhanced the hormone levels and alleviated the histological injury. CP-induced lipid peroxidation leads to the structural damages in spermatozoa and testicular tissue of rats, and also UD shave a protective effect on these types of damage.

Keywords: Urtica dioca, Cyclophosphamide, Oxidative stress, Testosterone, Antioxidant.

NSBMB/UPH/MB/115

Anti-Dysenteric Activity of *Vernonia amygdalina* (Bitter Leaf) Stem Bark Against *Escherichia coli*

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ABSTRACT

Dysentery remains a significant global health concern, particularly in regions with limited access to healthcare and sanitation. This study investigates the potential anti-dysentery properties of Vernonia amygdalina, commonly known as bitter leaf, specifically focusing on the stem bark in aqueous and ethanolic extracts against Escherichia coli, one of the major causative agents of dysentery. Additionally, the phytochemical composition of the extracts was analysed to gain insights into the bioactive components of the plant. This research employed

agar well diffusion method and also a range of concentrations (50-150mg/ml) in both the aqueous and ethanolic extracts. This study revealed promising results, zones of inhibition measuring 7.5mm and 10.8mm in the aqueous and ethanolic extracts, respectively with minimum inhibitory concentration of 50mg/ml. These results suggest the potential of bitter leaf stem bark in combating E. coli, a key pathogen associated with dysentery. This study therefore underscores the medicinal potential of Vernonia amygdalina stem bark in the context of dysentery. The observed inhibitory effects against E. coli provide a strong foundation for further research in the pursuit of safe and efficacious treatments for dysentery. This research contributes to the broader field of natural medicine, drug discovery and have a significant impact on global health, especially in regions where dysentery remains a major public health concern.

Keywords: Anti-Dysenteric, Vernonia amygdalina, Extract.

NSBMB/UPH/MB/116

Effect of Dichloromethane fraction of *Uraria picta* extract on Monosodium Glutamate (MSG) Induced Uterine Fibroid in Wistar albino Rats

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ABSTRACT

Uterine leiomyoma commonly termed uterine fibroid constitutes a significant reproductive threat in women worldwide. This study focused on the effect of Dichloromethane fraction of *Uraria picta* on MSG induced fibroid in wistar rats. Twenty five rats were randomly assigned into 5 groups. The animals in Group 1 served as the normal control and received 1.0 mL distilled water daily. The animals in group 2 served as the negative control and were administered 800mg/kg MSG, group 3 were treated with 100 mg/kg vitamin E (Positive control), while group 4 received a combination of 800 mg MSG/kg + 100 mg *Uraria picta* fraction and group 5 received a combination of 800 mg MSG/kg+100mg/kg vitamin E. However, the animals were treated concomitantly with MSG and extracts only for 30 days. The experiment lasted for 30 days. At the end of the study, the animals were fasted overnight and sacrificed by cervical dislocation. Blood was collected by cardiac puncture into plain sterile sample bottles. Serum was prepared by centrifugation (3000rpm for 15mins) and used for the analysis of serum estradiol (estrogen) progesterone and enzyme aromatase. The results showed that Monosodium Glutamate (MSG) alone increased progesterone, estradiol and aromatase levels, which are biomarkers of uterine fibroid thereby inducing fibroid in the rats. However, treatment with vitamin E supplement and Uraria *picta* fraction near-completely ameliorated the effects caused by the MSG alone. The vitamin E as an antioxidant was able to scavenge for free radicals induced by the MSG, also *Uraria picta was able* to correct the hormonal imbalance of estrogen metabolism caused by the MSG thereby leading to apoptosis of fibroid or tumour cells. The results obtained from this study may offer the possibility of treating women with fibroids for long term without the need for surgery or other hormonal supplement.

NSBMB/UPH/MB/117

Effect of Aqueous Leaf Extract of Copper Leaf (Acalypha Wilkesian: Euphorbiaceae) On Weight of Monosodium Glutamate (Msg)-Induced Obesity in Albino Wistar Rats

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ABSTRACT

Obesity is a condition that occurs when a person has excess weight or body fat that might affect their health. The potential effect of aqueous extract of the leaves of Acalypha wilkesian on weight of monosodium glutamate (MSG) induced obesity in albino wistar rats was investigated. Induction of overweight was conducted using monosodium glutamate (MSG) at a dose of 400 mg kg^{-1}. In vivo investigation showed that oral daily dose of 200 mg kg^{-1} of aqueous extract of the leaves of Acalypha wilkesian on weight of monosodium glutamate (MSG) showed significant loss of body weight after fourteen days while 400 mg kg^{-1} of the extract showed significant loss of body weight after seven days. The phytochemicals screening indicate the presence of alkaloid, flavonoids, phenol, tannins phlobatannins and. Thus, the plant could be used as a vital sources of supplementary diets of several bioproducts essential for the biochemical functions in human and provide health benefits. This study showed that Acalypha wilkesian has an anti-obesity effect.

Keywords: albino rats, monosodium-glutamate, medicinal plants, obesity

NSBMB/UPH/MB/118

Assessment of Protective Potential of Vitamin E Against Nitrocellulose Thinner Induced Oxidative Stress In The Liver Tissues of Male Rats.

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ABSTRACT

This study assessed the effect of vitamin E on some liver tissue oxidative stress markers in male albino *wistar* rats exposed to nitrocellulose thinner. Thirty male Wistar albino rats were randomly distributed into five groups with 6 rats each after one week of acclimatization. Group 1 served as control, receiving normal rats chew and water; while Group 2 served as positive control, exposed by inhalation to nitrocellulose thinner (NCT) only. Groups 3, 4 and 5, in addition to inhalation exposure to NCT, were concomitantly orally administered 150, 300 and 450mg/kg body weight of vitamin E, respectively for ninety days. After ninety days, the animals were sacrificed and their liver tissues collected, and homogenized using phosphate buffer, for oxidative stress markers analysis; melonydehyde (MDA), reduced glutathione (GSH), catalase (CAT), and superoxide dismutase (SOD), glutathione reductase (GSH_{red}); using standard methods. The result obtained showed that inhalation exposure to NCT produced a significant ($p<0.05$) increase in liver tissue MDA level, and decrease in liver tissue CAT, SOD, GSH, and GSH_{red} activities; when compared with control. However, administration of vitamin E to rats exposed to NCT was observed to produce a significant ($p<0.05$) decrease in

tissue MDA, and increase in the activities of the tissue CAT, SOD, GSH, and GSH_{red} to the level within the control range, when compared to the group exposed to NCT only. The results of this study suggest that vitamin E, being a known antioxidant, can provide protection against NCT-induced oxidative stress in male rats.

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Antidiabetes Effect of Ethanol Leaf Extract of *Cassia tora Linn* on Diabetic Model of *Drosophila melanogaster*

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ABSTRACT

Cassia tora Linn is an annual weed that has many pharmacological properties including hypolipidemic, anti-hyperglycemic, and wound healing properties. This study investigates the hypoglycemic effects of ethanol leaf extract of *Cassia tora L.* in the diabetes induced *Drosophila melanogaster* (fruit fly). The toxicity test was also conducted by feeding the fruit fly with high dose of 1000 mg and 500 mg of ethanol leaf extract. Diabetes was induced in 3-Days Old *Drosophila melanogaster* using a 30% sucrose diet for 7 days. After diabetes induction, they were grouped into 4 of 30 flies each. Group A contained healthy flies of equal number as a normal control group and received 10g of normal diet, group DC received 10g of 30% sucrose diet (diabetes untreated), groups C and D received 10g of 30% sucrose diet plus 500mg and 10g of 30% sucrose diet plus 1000 mg of leaf extract, respectively. The treatment lasted for 7 days. The results of the toxicity study showed that *Drosophila melanogaster* fed with 1000 mg and 500 mg had 6.66 % and 3.33 % mortality rate and weight was significantly reduced ($P < 0.05$). The glucose and trehalose levels of groups treated with leaf extract also reduced as compared to the diabetic untreated group (DC). The result of this research indicates that ethanol leaf extract of *Cassia tora* exhibits hypoglycemic potential. Therefore, the hypoglycemic potential of the plant extract is attributed to its rich phytochemicals. The work could suggest further research to isolate and characterised the active ingredient responsible for its anti-diabetes effect.

***Keywords*:** Antidiabetic effect, *Drosophila melanogaster* body weight, glucose and trehalose levels

NSBMB/UPH/MB/120

Multiple Insecticides Resistance In Sympatric *Anopheles Gambiae* S.L. And *Anopheles Funestus* Mosquito Populations In The Sahel Of Nigeria

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ABSTRACT

Insecticide resistance among the vectors of malaria and lymphatic filariasis (LF) exist in the African continent which could unintentionally affect different species of *Anopheles* mosquitoes found in the Sahel of Nigeria. This study's objectives were to identify the *Anopheles* mosquito species and its insecticide resistance profile. The study was carried out in Gajerar Giwa village and Batagarawa town. Using a mechanical aspirator, blood-fed mosquitoes were captured indoors and identified morphologically and molecularly. The WHO procedure was followed in insecticide susceptibility bioassay using F_1 mosquitoes, and PCR was used to check for the existence of the *kdr* mutation in *Anopheles* mosquitoes that had survived exposure to permethrin. They were identified as *Anopheles gambiae s.s*, *Anopheles coluzzi*, and *Anopheles funestus s.s*. An insecticide susceptibility test revealed that *Anopheles gambiae s.l* from Batagarawa town and *Anopheles funestus s.l* from Gajerar Giwa hamlet were more susceptible to deltamethrin, bendiocarb, propoxur, and malathion but resistant to permethrin and DDT. *Anopheles funestus s.l* from Gajerar Giwa showed a death rate increase from 44.2 to 62.44% after pre-exposure to 4% piperonyl butoxide (PBO). Effective vector control strategy can be guided by the presence of permethrin and DDT crosses resistance in both *Anopheles gambiae s.l* and *Anopheles funestus s.l.*

Keywords: Permethrin, *Anopheles gambiae s.l* and bendiocarb

NSBMB/UPH/MB/121

Effects of Consumption of Goat Carcass Singed With Petrol or Scrap Tyre Fire on Kidney Function Parameters of Male and Female Wistar Rats

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ABSTRACT

This study investigated the effects of consumption of goat carcass singed with scrap tyre fire or petrol fire on kidney function parameters of male and female Wistar rats. A total of 36 male and female Wistar rats divided randomly into six groups (1-6) of six rats each were used for the study. Groups 1 and 4 were female and male control respectively, fed diets of goat carcass de-haired with a razor blade. Groups 2 and 3 were male and female respectively, fed diets of goat carcass singed with scrap tyre fire, while groups 5 and 6 were male and female respectively, fed diets of goat carcass singed with petrol fire. The feed and water were given *ad libitum* for 28 days after which the rats were sacrificed, blood collected and kidneys harvested for kidney function analysis using standard methods. The urea, creatinine, sodium, and potassium concentrations of group 6 rats (6.75 ±0.42 µmol, 132.50 ±7.69 µmol, 132.33 ±5.07 µmol, 3.60 ± 0.19 µmol) were significantly higher than those of group 1(4.97 ± 0.55 µmol, 126.83 ± 4.98 µmol, 115.16 ±1.49, and 2.77 ±0.13µmol). The urea, creatinine, sodium, potassium and bicarbonate concentrations of group 5 rats (3.9 ± 0.37µmol, 80 ±6.17µmol, 136.25 ±4.53µmol and 3.67 ±0.13µmol) were also significantly higher than those of group 4 (3.43± 0.24µmol, 71.33± 3.48 µmol, 124.66± 6.23 µmol and 3.33± 0.18 µmol). Similar results were obtained for the scrap tyre-derived goat meat for both the male (group 2 vs 4) and female (group 3 vs 1) rats. Histological analysis of groups 2, 3, 5, and 6 showed kidney tissues with marked atrophying renal micro-architecture, and areas of hemorrhagic blood vessels within the renal matrix. The results of this study suggest that consumption of goat meat singed with scrap

tyre fire and petrol fire is harmful to the kidneys of consumers as it may affect both the function and integrity. Further studies are recommended to expand on these findings.

Keywords: Singeing, de-haired, kidney, carcass, histology, creatinine

NSBMB/UPH/MB/122

Impact of Monosodium Glutamate (MSG) On Biochemical Functions And Haematological Indices of Wistar Rats.

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ABSTRACT

The impact of monosodium glutamate (MSG) on biochemical functions and haematological indices of Wistar rats was investigated in this study. Thirty-five Wistar rats weighing between 100g to 120g were randomly divided into five groups of seven rats each, (one control group and four treatment groups). The control group was fed with rat chow (growers mash) only, while the test groups were fed diets and supplemented with daily oral doses of 200mg/kg body weight of pure and food grade MSG solutions for 30 days. At the end of the experiment, the rats were sacrificed and blood sample from each rat was collected for test analysis on haematological indices and hepatic and renal function tests. Results showed that all the studied haematological parameters (PCV, Hg, RBC, lymphocytes, monocytes, eosinophil and basophils,) were not significantly influenced, except for Platelets and WBC counts that showed significant increase ($p \geq 0.05$). No significant differences were associated with lipid profile biomarkers (cholesterol, triglyceride and LDL) for all MSG treated groups, though HDL-Cholesterol increased slightly ($p \geq 0.05$). MSG impact was significantly low ($p \leq 0.05$) in sodium and bicarbonate levels, while chloride, urea and creatinine slevels howed significant increase ($p \geq 0.05$) in comparison to the control group. A moderate elevation was observed in AST, ALT, total protein, C-reactive protein, glutathione, bilirubin and lactase dehydrogenase (LDH) levels in all four groups treated with MSG, and a non-significant decrease in ALP levels. Therefore, administering low concentrations of MSG did not alter the haematology and biochemical function of the Wistar rats.

Keywords: Monosodium Glutamate, Lipid Profile, Haematological Indices, Renal Function

NSBMB/UPH/MB/123

Mosquitocidal Activity of Gram-Negative Bacteria on *Anopheles Gambiae*

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ABSTRACT

Malaria still remains the deadliest mosquito borne disease in the world and is responsible for more than 400,000 deaths each year, and Dengue, Yellow Fever, Chikungunya and Zika have caused severe disease outbreaks in many urban areas. The current strategies for the control of these disease have failed due to insecticide resistance. Hence, there is a need to develop a better

alternative to mitigate parasite transmission by the mosquitoes. The presence study explored the used of some gram-negative bacteria for mosquitocidal potential *on Anopheles gambiae*. Exactly, five (5) gram positive bacteria were cultured and counted using McFarland turbidity standard. The larvae and adult of *Anopheles gambiae* were exposed to *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella typhi*, *Klebsella pneumoniae* and *Yersinia pestis* at different microbial loads using direct exposure assay and the mortality were recorded. *K. pneumonia* and *P. aeruginosa* are found to have larvicidal activity. *K. pneumonia*, *P. spp* and *P. aeruginosa* have shown to have adulticidal activity. The study has unlocked the potential of gram negative bacterial as a biological tool for the control of mosquitoes.

Keywords: *Gram negative, Anopheles gambiae, mosquitocidal, and Bacteria*

NSBMB/UPH/MB/124

Persea americana Seed Extract And Fractions Modulate Insulin Resistance And Pro-Inflammation In Type 2 Diabetic Wistar Rats

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ABSTRACT

Persea americana seeds are among the plants used traditionally in management of diabetes. Although studies have validated its anti-diabetic property, however, little is known about its role in modulating the diabetic pathogenic process of T2DM. Hence, the effect on insulin resistance (IR) and the associated biomarkers that mediate complications were studied. The ethanol extract (WE), was further fractionated to obtain ethyl-acetate fraction (EF) and the residue fraction (RF). These were analyzed for chemical composition by Fourier transform infrared spectroscopy (FTIRS) and gas chromatography mass spectroscopy (GCMS). Insulin resistance (IR) was induced in 6 groups of 7 rats each, via initial oral administration of 20% sucrose for 17 days, followed by 12-day feeding of high fat diet. Thereafter 5 of these, were made diabetic by ip streptozotocin (40 mg/kg b.w.). The 5 T2DM groups were administered 1000 mg/kg bw (*p.o.*) each of WE, EF and RF, metformin and placebo, for 24 days. Afterwards, serum glucose, insulin, adiponectin and tumor necrosis alpha factor (TNF-α) and homeostatic assessment of insulin resistance (HOMA-IR) were estimated. The results obtained showed that the extracts and fractions, lowered serum glucose level and HOMA-IR ($p < 0.05$) and raised the level of insulin ($p>0.05$), indicating modulation of insulin resistance, the hallmark of T2DM. FTIRS reveal a variety of active functional groups and GCMS, 34, 44 and 29 active components in WE, EF and RF respectively. Overall, the seeds were found to possess active compounds with potential to modulate insulin resistance possibly via synergistic actions in T2DM.

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Hypoglycaemic, and *In Vitro* Alpha Amylase and Alpha Glucosidase Inhibitory Activities of the Chloroform Leaf Extract of *Ficus polita*.

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ABSTRACT

Ficus polita is an evergreen small tree or shrub which belongs to the family *Moraceae*, and various parts of this plant had been found to possess several medicinal properties. The present study was conducted to evaluate the hypoglycaemic and *in vitro* α-amylase and α-glycosidase inhibitory properties of the chloroform leaf extract of *F. polita.* Qualitative phytochemical screening of the fractions of chloroform leaf extract of *F. polita* was investigated. The hypoglycaemic potential of the fractions of chloroform leaf extract of *F. polita* were tested, at a dose of 50 mg/kg, on alloxan induced wistar rats. *In vitro* α-amylase and α-glycosidase inhibitory activities of fraction 3 (F3) of the chloroform leaf extract of *F. polita* were determined. Phytochemical screening of the fractions of chloroform leaf extract revealed the presence of alkaloids, tannins, flavonoids, and terpenoids. The fractions of the chloroform leaf extract of *F. polita* were shown to decrease the levels of fasting blood glucose, with fraction 3 (F3) as the most active in terms of the hypoglycaemic activity. Fraction 3 (F3) was found to inhibit (*in vitro*) α-amylase and α-glycosidase activities.

Keywords: hypoglycaemic, α-amylase, α-glycosidase, *Ficus polita.*

NSBMB/UPH/MB/126

Effect of *Gongronema Latifolium* And *Telfairia Occidentalis* Fractions On Glucose Concentration, Hepatic Function And Pancreas Histology In Diabetic Wistar Rats.

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ABSTRACT

Diabetes mellitus is a global health concern with rising prevalence rates worldwide. Hyperglycemia in diabetes may lead to several complications, hence this study investigated the effect of n-hexane and ethylacetate fractions of *Gongronema latifolium* (GL) and *Telfaria occidentalis* (TO) on glucose level, liver function and pancreas histology in diabetes induced Wistar rats. Forty-five (45) matured male rats were divided into 9 groups of 5 rats each. Groups

I and II served as normal control (NC) and diabetic control (DC) respectively. Group III received glibenclamide (GLI) while Groups IV and V received n-hexane and ethylacetate fractions of GL respectively. Groups VI and VII received n-hexane and ethylacetate fractions of TO respectively while Group VIII received combined n-hexane fractions of GL and TO and Group IX received combined ethylacetate fractions of GL and TO all at 400mg/Kg body weight respectively for 14 days. There was a significant ($p < 0.05$) decrease in blood glucose concentration across groups treated with the single and combined fractions compared with the diabetic control. The group treated with n-hexane fraction of TO showed the best antidiabetic activity. Histology of the pancreas showed shrunken endocrine pancreas in diabetic control group while improved histological features were observed in the pancreas with administration of the fractions. Liver enzyme activities were significantly higher in diabetic control group compared to the fractions treated groups. The fractions improved the histological features of the liver compared to the diabetic control group. These findings therefore confirm the antidiabetic and hepatoprotective potentials of *Gongronema latifolium* and *Telfairia occidentalis*, suggesting these plants in synergism may potentiate the antidiabetic and hepato-protective activity.

Keywords: Diabetes mellitus, *Gongronema latifolium, Telfairia occidentalis,* hepatocyte, blood glucose level

NSBMB/UPH/MB/127

Enhanced Antimalarial Activity and Hemocompatibility of Iron Oxide Nanoparticles Synthesized Using *Annickia affinis* Stembark Methanol Extract

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ABSTRACT

Annickia affinis stembark is commonly used for managing malaria in Nigeria. Although it has excellent antiplasmodial activity *in vitro*, it is only moderately potent in mice when administered via oral route. Protoberberine alkaloids have been identified as its bioactive principles. These alkaloids have poor oral pharmacokinetics including being substrates of the intestinal efflux transporter P-glycoprotein, poor solubility, as well as having a wide tissue distribution. Amongst other benefits, nanoparticles can enhance drug delivery to target tissues. We therefore compared the acute toxicity and *in vivo* antimalarial activity of *A. affinis* stembark methanol extract (AASME) with iron oxide nanoparticles synthesized using the extract (AAN). Further, as induction of haemolysis could be a shortfall in nanoparticle development, we investigated the ability of AAN to lyse red blood cells (RBCs). Both samples were non-toxic to mice. No mortality was recorded at 2000 and 2 mg/kg b.wt. for AAMSE and AAN respectively. Mice administered graded doses of AASME (100, 250 and 500mg/kg b.wt.) had 56.45. 36.16 and 31.59 % parasitemia (%P) respectively translating into an IC_{50}*P.berghei* of 148 ± 2.19 mg/kg b.wt. Intriguingly, mice administered AAN (1 mg/kg b.wt.) had 27.42 %P (i.e. IC_{50}*P. berghei* < 1 mg/kg b.wt.). Haemolysis assay revealed, that AAN only lyses RBCs (IC_{50}RBC lysis = 3.9 mg/ml) at concentrations ~16-fold higher than those relevant for parasite

killing. AAN thus possesses excellent antimalarial activity which it combines with good hemocompatibility. The enhanced antimalarial activity of AAN suggests a possible improvement of the oral pharmacokinetics of protoberberine alkaloids following nanoparticle synthesis.

Keywords: *Annickia affinis*, Antimalarial, Protoberberine alkaloids, Bioavailability, Nanoparticle

NSBMB/UPH/MB/128

Effect of Aqueous Extract of *Curcuma longa* on Serum Antioxidant Status and Renal Function Tests of Cadmium-induced Toxicity on Albino Rat Model

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ABSTRACT

Due to its widespread use, Cadmium poses a serious threat to both human and animal health. Turmeric (*Curcuma longa*) contains bioactive compounds that possess a wide range of biological activities including the ability to act as metal chelator for heavy metals. This study was designed to determine the ameliorative effect of turmeric on serum antioxidant and kidney parameters of cadmium-induced toxicity in albino rat model. Forty-two (42) rats were randomly separated into six (6) groups containing seven (7) rats each: group 1 received standard rat chow and water only; group II was induced (4 mg/kg of cadmium solution) but left untreated, group III was the treatment control (400 mg/kg body weight of turmeric), groups 4-6 were treated with 100-, 200- and 400 mg/kg body weight of turmeric respectively after induction with 4 mg/kg body weight of cadmium solution. The experiment lasted for 21 days after which the rats were sacrificed for blood collection; kidney was harvested, ground, preserved in a buffer solution and taken to the lab for further analysis. Results showed that GPx activity and Vit C concentration had a significant ($p < 0.05$) increase in the treatment groups when compared to the untreated control. The mean urea and creatinine levels showed a significant ($p < 0.05$) decrease compared to the untreated control. There was a significant ($p < 0.05$) difference in the sodium ions when compared to the untreated group. The mean values for the bicarbonate and chloride ions were statistically non-significant ($p > 0.05$) when compared with their untreated groups. In conclusion, aqueous extract of turmeric is effective in ameliorating the effect of cadmium induced toxicity on serum antioxidant status and renal potassium and sodium ions, and also on urea and creatinine levels.

Key words: Cadmium-toxicity, bioactive, *Curcuma longa*, antioxidant, metal chelator

NSBMB/UPH/MB/129

Effect of Methanol extract of *Citrullus lanatus* seed on Prostate Specific Antigen, hepatic enzymes and Hematological Parameters in Rats Induced with Benign Prostate Hyperplasia.

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ABSTRACT

Benign prostatic hyperplasia (BPH) is a progressive pathological condition commonly observed in elderly men, marked by the enlargement of the prostate gland and symptoms such as painful and frequent urination. The aim of this study was to determine the effect of methanol extract of Citrullus *lanatus* (MECL) seed on Prostate Specific Antigen, hepatic enzymes and Hematological Parameters in Benign Prostate Hyperplasia induced male rats. Phytochemical and acute toxicity study was conducted on the seed of *Citrullus lanatus* using standard methods. Thirty-six (36) male albino rats were allocated into five groups of 6 rats each. Group 1 the normal control, received 1ml normal saline orally daily and a subcutaneous injection of 1ml Olive oil, Group 2 the disease control received 5mg/kg testosterone propionate and 1ml olive oil orally, Group 3 the Standard drug control, received 5mg/kg each of testosterone propionate and 5mg/kg Finasteride. Groups 4 and 5, both received 5mg/kg testosterone propionate along with 50mg/kg of MECL. Testosterone administration was performed via Subcutaneous injection every other day. At the conclusion of 28 days experimental treatments, the animals were euthanized using cervical dislocation and blood was collected via cardiac puncture for biochemical analysis. Phytochemical studies revealed elevated levels of Flavonoids followed by saponin and reducing sugar. Cyanogenic glycoside had the lowest value. An acute toxicity test yielded a result of > 5000mg/kg. Prostate weight and PSA levels markers for BPH significantly decreased ($P< 0.05$) in treated BPH rats compared to diseased control group. Body weight, MCV, MCH, MCHC, HB, PCV, RBC and WBC significantly increased ($P< 0.05$) in treated BPH group compared with non-treated rats. No significant difference ($P >0.05$) was observed in selected vital organs, AST, ALP and ALT activities in all the experimental groups. This study suggests that *Citrullus lanatus* seed is safe and may contain important phytochemical constituents with potential benefits in preventing or suppressing the development of BPH and could be useful in treatment.

Keywords: *Citrullus lanatus*, hematology, benign prostrate hyperplasia, testosterone, phytochemicals

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Amino acid and Fatty acid composition and Anti-inflammatory activity of *Andrographis paniculata* leaf

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ABSTRACT

The amino acid, fatty acid and anti-inflammatory activity of *Andrographis paniculata* was investigated using standard methods. *Andrographis paniculata* is an annual herbaceous plant native to India, Sri Lanka, Pakistan, and Indonesia and has a spread in China, Thailand,

Mauritius, East and West Indies. The herbal medicine of AP was widely used in the treatment of cancer, hypertension, influenza, and antidiabetic by the people of Asia, America, and Africa. Investigations into amino acids composition revealed about 18 amino acids in different concentrations. Amino acids found include; Histidine (2.88856g/100g), leucine (7.43935g/100g), glycine (3.87481g/100g), aspartate (12.20628g/100g), glutamate (14.69341g/100g). Fatty acid composition revealed some saturated fatty acid such as; lauric acid (4.0537ug/ml) and stearic acid (28.1534ug/ml) and unsaturated fatty acids such as; linoleic acid (9.6223ug/ml), linolenic acid (5.1509ug/ml), oleic acid (36.8636ug/ml). Anti-inflammatory activity was analyzed using Albumin Denaturation, Antiproteinase action, Heat Induced Heamoglobin, and Anti – lipoxygenase activity to show anti-inflammatory activity. These activity is due to the presence of bioactive compounds present in the plant. This study has shown that the presence of these different bioactive nutrients chemical are the reason why *Andrographis paniculata* posses anti-inflammatory activity.

Key words: Amino acid, Fatty acid, Bioactive nutrient chemical, *Andrographis paniculata*, Anti-inflammatory activity.

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Bioactive Nutrient Composition And Anti-Oxidant Activity Of *Andrographis Paniculata* Leaf.

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ABSTRACT

Some bioactive nutrient chemical composition of *andrographis paniculata* leaf were investigated using standard methods. *Andrographis paniculata* leaves were harvested from garden in umuchichi, Aba, Abia state and processed for further studies. *Andrographis paniculata* commonly known as the green chiretta belongs to the family Acanthaceae. It is widely known as Kalmegh and popularly called as King of bitters. It has its use in the traditional system of medicines such as Siddha system, Ayurvedic system and Chinese medicine for the regular treatment of a common cold and many other diseases. The mineral content showed the presence of some minerals such as Calcium (10.003ppm), Potassium (6.754ppm), and Iron (0.433ppm). The vitamin composition should presence of some B complex vitamins and other vitamins such as vitamin C (60.42963mg/kg), vitamin D (3.149254mg/kg), and vitamin A (5.07393mg/kg). Proximate composition investigation showed carbohydrate (62.152%), moisture content (9.313%), and fibre content (5.741%). Investigations into the anti-oxidant activity of *andrographis paniculata* showed anit-oxidant activity in Nitric oxide activity and Superoxidase scavenging activity. In conclusion, this study has shown that the presence of these different bioactive nutrients chemical are the reason why *Andrographis paniculata* posses anti-oxidant activity.

Key words: Bioactive nutrient chemical, *Andrographis paniculata*, Proximate composition, Anti-oxidant activity, Mineral, Vitamin.

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Effect Of Ethanol Stem Bark Extract Of *Annona Muricata* On Some Invivo Antioxidant Potentials Of Alloxan Induced Diabetic Rats

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ABSTRACT

Antioxidant properties of ethanol stem bark extract of *Annona muricata* (soursop) in *alloxan* induced diabetic rats were investigated. Thirty (30) wistar albino rats ranging between 130-150g were carefully shared into five (5) groups of six (6) rats each. Group B-E was intraperitoneally administered with 60mg/kg b.w single dose of *alloxan* monohydrate, whereas group A was normal control and was given distilled water and feed. Group C was further administered with 5mg/kg glibenclamide to act as positive control, while D and E groups were administered with 100 and 400mg/kg b.w of *Annona muricata* stem bark extract. After administration, the rats were sacrificed and blood samples collected via ocular puncture, then invivo antioxidant enzymes and phytochemstry were assayed. The result showed that *Annona muricata* ethanol stem bark had phenol, alkaloids, saponins, cardiac glycoside, anthocyanin and tannin in appreciable quantity. Antioxidant enzymes analyzed showed that CAT, GPX and SOD had significant reduction between groups B-E when compared to group A. In conclusion, the plant contains some phytochemicals and invivo antioxidants enzymes which could assist in mopping up free radicals generated as a result of *Diabetes mellitus*.

Keywords: *Annona muricata*, *Diabetes mellitus*, Antioxidant, Alloxan.

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Telfairia occidentalis supplementation attenuate Carbon-tetrachloride-induced Hepatic damage and Oxidative stress

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ABSTRACT

This study investigated hepatoprotective effect of *Telfairia occidentalis* on Carbon-tetrachloride (CCl_4)-induced toxicity in wistar rats. Five experimental groups were used in this study. One group received distilled water and served as normal control. Second group received

Carbon-tetrachloride (CCl_4) alone for four days. Third and fourth groups received CCl_4 for four days prior to treatment with 200 mg/kg BW and 400 mg/kg BW *T. occidentalis* aqueous extract for six days respectively. The last group received CCl_4 for four days prior to treatment with Silymarin (100 mg/kg BW) for six days. With exception of normal control rats, all rats received a mixture of freshly prepared CCl_4 in olive oil (1ml/kg BW, 1:1 intraperitoneally) for 4 days. Activities of enzyme markers of hepatocellular damage in serum, aspartate aminotransferase (AST), Alanine aminotransferase (ALT), alkaline Phosphatase (ALP), Lactate Dehydrogenase (LDH), Acid Phosphatase (ACP); antioxidant enzymes, Superoxide Dismutase (SOD) and Catalase (CAT) and oxidative stress molecules: Malondialdehyde (MDA), and Nitric Oxide (NO) in the liver homogenates were measured. Results showed that exposure to CCl_4 orchestrated significant ($p < 0.05$) increases in AST, ALT, ALP, LDH, ACP, MDA and NO and significantly ($p < 0.05$) decreased SOD and CAT. However, treatment with *T. occidentalis* aqueous extract at a dose of 200 mg/kg BW and 400 mg/kg BW alleviated the toxic effects of CCl_4 in a concentration dependent manner. The result of toxicity of CCl_4 and hepatoprotection by *T. occidentalis* were corroborated by histopathological analysis. In conclusion, this study established that *T. occidentalis* possesses and enhanced antioxidant activity, thus attenuating CCl_4-induced hepatic oxidative damage and oxidative stress in wistar rats.

Keywords: Antioxidants, Hepatotoxicity, Liver, Oxidative stress, *Telfairia occidentalis*

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Effect Of Aqueous Ethanol Leaf Extract Of *Anacardium occidentale* ON Liver And Kidney Parameters Of Wista Rats

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ABSTRACT

Anacardium occidentale leaf is a cashew plant which the leaves are used for therapeutic purposes in Nigeria and other parts of the world. This study was aimed at determining the percentage yield, and phytochemical content of the aqueous ethanol extract. The toxic effect of the extract was determined in acute toxicity (LD_{50}), percentage body weight gain, relative organ body weight ratio, on the kidney and liver functions parameters in the albino rats administered orally for 7 and 14 days. 27 adult albino rats were used. 3 were used for acute toxicity studies (up and down procedure) at 5000mg/Kg, while 24 were used for sub-acute toxicity, grouped into 6 animals per group. Group 1 (control), group 2, 3, and 4 were dosed with 100, 250 and 400mg/Kg of the extract respectively. The percentage yield was 44.66%, while the phytochemical analysis showed the presence of alkaloids, flavonoids, saponins, phenolic compound and Tannins, while a steroid is absent. The LD_{50} showed no mortality or sign of toxicity at the dose of 5000mg/Kg body weight in rats used. When compared with the control group, the percentage body weight gain showed decrease in weight as the days of administration increase from 7 to 14 days. The relative organ (liver) body weight ratio of all the treated rats showed non-significant ($p > 0.05$) different from the control while the relative organ (kidney) body weight ratio of groups 2 and 3 also showed non-significant ($p > 0.05$) different, but group 4 showed significant ($p < 0.05$) different. The AST, ALT, ALP, Bilirubin, Total protein and Albumin in the liver treated rats showed non-significant ($p > 0.05$) different from the control, while the kidney parameters, Creatinine and chloride also showed non-

significant ($p > 0.05$) different, but Urea, sodium, and potassium showed significant ($p < 0.05$) different in groups 3 and 4 of the treated rats. The results of sub-acute study suggest that the aqueous ethanol extract of *Anacardium occidentale* leaf may not be toxic to the liver, but toxic to the kidney at 250 and 400 mg/Kg body weight after the 14 days administration.

Keywords: Phytochemicals, Acute toxicity, Sub-acute toxicity, ethnomedicine, hepatotoxic

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Phytochemical, Antioxidant And Antisickling Potential Of *Tetrapleura Tetraptera* Fruit Extracts

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ABSTRACT

Sickle cell disease (SCD) is a prevalent and debilitating genetic blood disorder that poses a significant health challenge in Nigeria. *Tetrapleura tetraptera* fruit is used locally to manage the disease condition. It was prepared and fractionated into methanol extract (ME), fat-soluble extract (FAS), methanol-water extract (MWS), and ethanol-soluble extract (EWS) fractions using appropriate solvents. Sickle cell blood samples were used to determine the Fe^{2+}/Fe^{3+} ratio and hemoglobin polymerization experiment. The proximate, gas chromatography-mass spectrometry (GC-MS), antioxidant vitamins A, C, and E, and in vitro antioxidants (TAC, DPPH scavenging activity, and FRAP) of the methanol extract of the fruit were analyzed. The results showed that the fruit is a rich source of carbohydrates, crude fat, crude fiber, crude protein, ash, and moisture. GC-MS analysis revealed 16 bioactive compounds, including curcumin, N-benzylstearamide, phthalic acid, and cyclo-but-1-enylmethanol. Vitamin analysis showed that Vitamin C (0.45 mg/100 g) and Vitamin E (4.49 mg/100 g) were present, but Vitamin A was not detected. Antioxidants TAC and DPPH increased with increasing concentrations of the extract, whereas FRAP demonstrated the opposite trend. Leucine, Phenylalanine, Methionine, Isoleucine, Glutamic acid, Aspartic acid, and Arginine were among the essential and nonessential anti-sickling amino acids found in abundance in the fruit. Additionally, all the fractions of the fruit significantly inhibited polymerization and were also able to increase the $Fe^{2+/}Fe3^{+}$ ratio. Therefore, T. tetraptera has shown to be nutritionally and therapeutically beneficial and can be further researched and developed for the management of sickle cell disease and its related symptoms.

Keywords: *Tetrapleura tetraptera*, Sickle cell disease, polymerization inhibition, GC-MS analysis, amino acid profile

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Recycling Human Metabolic And Non-Metabolic Waste: The Bright Side Of The Moon

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ABSTRACT

The human population is put at 9.9 billion by 2050 scientific prediction, a population explosion capable of overstraining many of the Earth's resources. Every living thing makes metabolic and non-metabolic waste unusable for bodily function. Globally, waste volumes are increasing rapidly, and the globe faces a pollution crisis. The increasing call for a healthy environment and proper human waste management has spurred efforts towards comprehensive recycling waste. Recycling is one of the most important actions currently available to reduce the environmental impact of waste. Research in this direction has intensified throughout the past years, continuously unfolding new knowledge and technologies on human waste reuse. Recycling works on several fronts, preventing virgin stock from being unnecessarily depleted, and human waste is among them. This paper investigates and proposes a practical solution for the utilization of human waste. On the positive side, this review focuses on Recycling human waste into Biogas, thereby offering a new source of renewable energy, the potential for human waste to provide electricity, production of a cheap form of premium fertilizer, better nutrient management for agriculture, transforming into essential drinks, alongside food, effective therapy (fecal transplant), biosolid bricks for sustainable constructions and others. How human waste is efficiently recycled is vital for economic growth more circularly and sustainably. Earth recycles and reuses everything. Researchers take cues from Mother Nature and do no less: Critics point to diseases and the disagreeable odors caused by waste, but it is possible to recycle human waste safely for elsewhere mentioned purposes.

Keyword: Human waste, recycle, non-metabolic, metabolic waste and economic sustenance.

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Spotlight On Probable Health Impacts Of Wrappers Of Household Hawked Snacks Along Wettheral-Road Owerri.

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ABSTRACT

Care about what to eat and in what package it came with is food safety-wise. Staple food snacks wrapped in several packages impact the food. The notion that plant-based food has plant-based expected package materials is good. The research aim spotlights the probable health impacts of wrapping material used for local snacks. Food vendors of local snacks (Okpa, Ugba, and Abacha) hawking along Wettheral were granted oral interviews on the wrapping sheet (packaging) and the reason for using the wrappers. The foods selected were based on staple snacks obtained from Business people interviewed one week earlier on staple snacks. Retrieved information on the wrappers was used to search five databases. The search phrases are- the health consequences of the wrapper, the effects of heat on wrappers, and the safety status of the wrappers. The three snacks selected were based on frequency in the area, adjoin to their nutrition, and were ± 200g in a single wrap. The findings reviewed the following wrapping materials: Nylon plastics, aluminum foil, Styrofoam, and (Okpopia, Banana, and Plantain) leaves on the snacks. Further analyses produced the impact of the statement: Okpopia, Plantain, and Banana leaves are robust nutrient boasters embedded in phytochemicals and constituents (antioxidants and others). Aluminum foil has no necessary nutrient-deleting effects. It is separating myths from facts. Nylon hazards are enormous, ranging from cancer, endocrine

disruptions. The disturbing substances are Polystyrenes and others. Wrapper interaction with food can leak in. Food wrapping is good. Sadly, we hardly do without nylon**.**

Keywords: Spotlight, Staple food, Snacks, wrappers and health consequences

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Improving Diagnosis In Health Care Through Efficient Medical Laboratory Practices - A Focal Point On Management Of Diabetes Mellitus

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ABSTRACT

Getting the diagnosis right is a key to Diabetic care. The diagnostic process is a complex collaborative activity anchored by laboratory investigative findings. Diabetes, having multiplier effects on health and its signature on all organs, requires empirical investigations. The laboratory investigations add to that of the Doctors, as the latter cannot stand alone. The researchers focused on altered biochemical parameters in tissue derangements sequel to Diabetes mellitus and how laboratory findings polish the informed decisions made on the diagnosis and treatment of Diabetes mellitus. Doctors' decisions are a worthy attempt at identifying the underlying ill health, and laboratory results give the feelings of capability in rational thinking on the presented health condition. The research is significant because health cannot rely on guess explanations, irrespective of experiences. Data extractions were pooled from laboratory tests on Diabetic patients for four years in three standard hospital laboratories viz general hospital in Kubwa, Bwari, and Nyanya. The subset of the extracted data on diabetes from the three laboratories was analyzed. The findings from the data subset revealed abnormally elevated Serum glucose (glycosylated and nonglycosylated), moderate elevations of aminotransferases, electrolytes, and abnormal elevations in creatinine, uric acid, and urea. Urinalyses showed increased concentrations of protein, glucose, and ketones. The biochemical parameters status as judged by the laboratory reference range, which comprises the normal, below, and above values, were used for analyses. These findings were of immense contributions to the informed health decisions of Diabetic patients. There were better treatments for diabetes in the affected patients. The patients' diabetes mellitus improvements from Doctors' informed decisions, as anchored on the laboratory findings, gave merit to the research.

Keywords: Diabetes mellitus, laboratory investigations, biochemical parameters, Doctors decision and Diagnosis and treatment.

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Proximate Analysis And In-Vitro Antioxidant Potential Of Methanol Extract Of Fruit Pulp Of Doum Palm (*Hyphaene Hebaica*)

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ABSTRACT

Doum Palm (*Hyphaene thebaica*) is a traditional medicinal plant with reported medicinal properties. The study aim to investigate the proximate composition and in-vitro antioxidant potential of the methanol extract of fruit pulp of Doum palm. Proximate analysis was carried out using standard methods. The result shows high moisture content, (10.50±0.26%), a significant ash (5.79 ± 0.17%), low lipid (1.80 ± 0.12%), low protein (2.89±0.06%), high carbohydrate (70.023±0.89%) and substantial dietary fiber (9.22 ± 0.30%). Some mineral elements were determined using AAS. The result revealed Potassium (346.2±0.31), Magnesium (154.12±0.17), Iron (5.23±0.14), Zinc (0.59±0.31) Copper (0.51±0.41) and Cobalt (0.54±0.41). The antioxidant potential of the methanol extract was assessed using various in-vitro assays such as DPPH, H_2O_2, and FRAP assays. The antioxidant activity shows that the scavenging activity of methanol extract on DPPH showed non-significant (P>0.05) difference compare to vitamin C (standard) at various concentrations (100, 200, 400 and 800µg/ml). Also the scavenging effect of methanol extract on FRAP showed non-significant (P>0.05) difference compare to vitamin C at various concentrations. Furthermore, the scavenging the extract on Hydrogen peroxide showed non-significant (P>0.05) differences compare to vitamin C. Inclusion the findings suggest that the fruit pulp extract is a potential source of nutrients, and also demonstrated a remarkable antioxidant potential scavenging activity of the free radicals and reduces oxidative stress.

Key words: antioxidant, scavenging activity, vitamin C, Doum Palm, and mineral elements.

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Anti-ulcerogenic Potentials of Aqueous Leaf Extract of *Cirsium arvense* in Ethanol-induced Gastric Ulcer and its ameliorative effect on some biochemical parameters in wistar rats

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ABSTRACT

This study investigated the bioactive components of the leaves of *Cirsium arvense* and ascertained the ameliorative potentials of the aqueous leaf extract of the plant on some biochemical parameters in ethanol-induced gastric ulcer in wistar rats. Thirty (30) experimental animals were used and divided into six (6) groups of five (5) rats each. Ethanol (99%) was used to induce ulcer by oral administration of 1ml to each of the rats from group 2 to 6. Standard laboratory methods were used to carry out all the analysis. The quantitative phytochemical analysis revealed the presence of alkaloids, tannins, saponin, flavonoids, with flavonoids in high concentration. For the biochemical study, pre-treatment yielded a reduction in gastric

lesions in the gastric wall mucosa; an increase in the gastric pH and mucosa level; and a decrease in the gastric volume, free acidity, and total acidity in ethanol-induced wistar rats. The liver function test revealed significant ($p<0.05$) increase in aspartate aminotransferase, alanine aminotransferase and alkaline phosphatase activity, total protein, congugated bilirubin, total bilirubin, and albumin levels in test group 2 when compared to other groups. Electrolytes, urea and creatinine levels of the kidney showed significant ($p<0.05$) difference in test groups when compared to control group two. Serum antioxidant levels of glutathione, catalase, superoxide dimutase, malonaldehyde showed no significant ($p<0.05$) difference when compared to control group one. Investigations on the stomach walls was also done to ascertain the effect of the extract. This study has shown the bioactive component of *Cirsium arvense* leaf and its effect on some biochemical parameters of ethanol induced gastric ulcer in wistar rats and has revealed the plants potency and potential remedy in the management of gastric ulcer.

Keywords: Gastric ulcer, *Cirsium arvense*, ethanol, gastric mucosa, antioxidants.

NSBMB/UPH/MB/141

Some Biochemical Studies, Anti-Microbial Activities and Green Synthesis of Three Metallic Nanoparticles on Aqueous Extract of *Ficus exasperata Vahl.* Leaves

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ABSTRACT

Plants are very important sources of prevention and curing of diseases which have been found to be better than synthetic drugs. This study aimed at assessing the aqueous and ethanolic extracts of *Ficus exasperata* for phytochemical composition, radical scavenging ability, antimicrobial properties, synthesis and characterization of three metallic nanoparticles of *Ficus exasperata* using standard methods of analyses. The results of the study showed that the aqueous and ethanolic extracts contained varied concentrations of flavonoids, saponin, alkaloids, phenolic and steroid compounds. The results also showed that the plant extract possessed antioxidant properties by scavenging 2,2-diphenyl-2-picrylhydrazyl (DPPH) and nitric oxide radicals; thiobabituric acid (TBA) reactive species; as well as possessing strong ferric reducing antioxidant power (FRAP). The results of synthesized nanoparticles of AgNP, ZnNP and CuNP showed the reducing power of these nanoparticles on functional groups than the extract. The antimicrobial potentials of the extracts and nanoparticles showed a wide range of zone of inhibition of *Ralstonia solanecearum, E. coli, Pseudomonas glycinea, Staphylococcus aureus, Streptococcus faecalis, Xanthromonas phasaoli, Enterobacter aerogenes and Salmonella typhi* as well as *Trichophyton verrycosum* and *Epidermophyton floccosum*. The nanoparticles displayed better antibacterial and antifungal activities than the plant extract. Therefore, the study revealed important medicinal phytochemicals; high level of antioxidant potentials; strong reducing power of the synthesized nanoparticles as well as strong antimicrobial potential of the *Ficus exasperate* extracts which can be utilized in drug developments.

Keywords: Phytochemicals constituents, antioxidant potentials, zone inhibition, green synthesis, drug development

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Coula Edulis Nuts Mitigate Adiposity Via Modulation Of Molecular Targets On The Glycolytic, Phosphogluconate And Gluconeogenic Pathways In High-Fat-Diet Obese Wistar Rats

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ABSTRACT

Obesity is a global health concern, almost at epidemic proportion, associated with deregulated glucose metabolism. Previously we validated, scientifically, the use of *Coula edulis* nut extract (CEE) in body weight reduction. Therefore, the present study evaluated its effect on pace-setter and regulatory genes glucose metabolism in a bid to understand its molecular mechanism of anti-obesity. Thirty Wistar rats were divided into five groups treated thus: normal control (NC) fed rat chow only, obese control (OC) fed HFD only, standard control (SC) fed HFD and 30 mg/kg b.w. of Orlistat *p.o.*, and the last two, fed HFD with 1000 and 2000 mg/kg b.w. *p.o.* of CEE, respectively, for 10 weeks. Thereafter, blood, adipose and liver tissues were collected for biochemical and gene expression studies, with conventional PCR. The results showed over 50% reduction in serum glucose and insulin concentrations, & Homeostasis Model Assessment of Insulin Resistance (HOMA-IR), relative to OC ($p < 0.05$). Moreover, the CEE up-regulated the expressions of GLUT-2 transport protein, glucokinase, phosphofructokinase, and glucose-6-phosphate dehydrogenase, and concomitantly down-regulated the expressions of phosphoenolpyruvate carboxykinase gene, a critical gene of gluconeogenesis, implying a restoration of the dysregulated blood glucose. *In silico* studies, identified six (6) compounds from GC-MS and HPLC data of CEE, which possessed higher binding affinities compared to metformin, a conventional hypoglycaemic agent, and Orlistat, a hypolipidemic agent. Taken together, data from the study suggest that CEE nuts may possess promising natural products for the prevention and management of glucose dysregulation in obesity.

Key words: Obesity, *Coula edulis* nuts, carbohydrate metabolism, insulin resistance & gene expression.

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In Vivo Study of Anti-Inflammatory Activity of Ethanolic Extract of *Pistia stratiotes* (*L*) Medicinal Plant

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ABSTRACT

The equatorial and tropical regions of Africa are home to the hydrophyte *Pistia stratiotes*, which is a member of the Araceae family. It is also referred to as water cabbage and water lettuce. Recent interest in the potential therapeutic advantages of medicinal plants has been amplified by the presence of their inherent bioactive components. The purpose of this *in vivo* investigation was to determine whether or not *Pistia stratiotes* possess anti-inflammatory properties. The effect of *Pistia stratiotes* extract on inflammation in albino rats was investigated. To categorise the rats, five sets of five albino rats were utilised each time. The experimental groups consisted of the following: a positive control group, a normal control group, a low dose (200 mg/kg), a high dose (400 mg/kg), and an 80 mg/kg diclofenac group. The anti-inflammatory effects were assessed through the utilisation of the carrageenan-induced paw edoema technique. The results demonstrate that the extract significantly decreases the production of edoema. The high dose (400mg/kg) shows a remarkable inhibition of 61.14%, surpassing both the low dose (28.47%) and the positive control (0%). The extract exhibits substantial anti-inflammatory properties, similar to diclofenac (73.02%). The results indicate that the ethanolic extract of *Pistia stratiotes* exhibits strong anti-inflammatory properties, making it a promising candidate for the treatment of inflammatory disorders. The study suggests conducting additional clinical trials and developing formulations to fully realise the medicinal potential of the plant.

Keywords: *Pistia stratiotes*, medicinal plants, anti-inflammatory, in-vivo, carrageenan-induced paw edema, diclofenac,

NSBMB/UPH/MB/144

Assessment of Antioxidant And Anti-Inflammatory Prowess of *Conoclinium Coelestinum* In Malaria-Infested Mice.

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ABSTRACT

The goal of the current investigation was to assess the antioxidant and anti-inflammatory capabilities of *Conoclinium coelestinum*, a common ingredient in traditional Nigerian medicine, both in vivo and in vitro. 80% ethanol was used as a solvent in the maceration method of extraction. Certain essential antiplasmodial components, such as alkaloids, flavonoids, glycosides, and terpenoids, were found by phytochemical screening. In vitro ferrous ion chelating, 2,2-diphenyl-1-picrylhydrazyl, hydrogen peroxide scavenging, and total antioxidant activities were all significantly indicated by the extract, with IC50 values of 4.56±0.28 µg/mL, 5.74±0.11 µg/mL, 5.85±0.11 µg/mL, and 8.02±0.50 µg/mL, respectively. Six groups of six mice each were randomly assigned to the mice. Group II (negative control) was infected but not treated, Group III (positive control) was infected and treated with the standard medication Artesenute, and Groups IV - VII were infected and treated with three different doses (250, 500, and 1000 mg/kg) of the extracts respectively. Group I (neutral control) received no treatment at all. Following a 10-day course of treatment, samples were taken in order to perform assays for indicators of inflammation and antioxidant activity, including SOD, CAT, GSH, GST,

MDA, TNF, IL-1, COX-2, and NO. When the extract was given to mice infected with malaria, the levels of MDA in the liver were dramatically ($P < 0.05$) decreased, while the levels of SOD, CAT, GSH, and GST were increased. Interestingly, TNF and IL-1 concentrations were lowered by *C. coelestinum* at all tested doses to a level that was lower than that achieved by the conventional medication. Furthermore, COX-2 and NO levels were lowered by the extract at a dose of 300 mg/kg to a level that was statistically equal to that of the normal control group. The findings show that the leaf extract possesses strong anti-inflammatory and antioxidant properties.

Keywords: Antioxidant, Inflammation, *Conoclinium coelestinum*, Malaria

NSBMB/UPH/MB/145

Ameliorative Effects of *Tetrapleura tetraptera* Dry Fruit Extract on Hematological Abnormalities and Lipid Profiles in Calcium Carbide Exposed Rats

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ABSTRACT

This study sought to evaluate the possible therapeutic effects of *Tetrapleura tetraptera* dry fruit extract (TTE) on hematological abnormalities and lipid profiles in rats exposed to calcium carbide (CaC_2). Forty-eight (48) male Wistar rats were randomly assigned to six (6) experimental groups (A-E) with n=8. The control groups were A, B, and C, while D, E, and F acted as the treatment groups. Calcium carbide was dissolved in normal saline and administered orally via gastric gavage at a dose of 100 mg/kg body weight. Group A received 1ml of normal saline, group B received 100 mg/kg body weight CaC_2, group C received 150 mg/kg body weight TTE, and groups D, E, and F received 100 mg/kg body weight CaC_2 and 50, 100, and 150 mg/kg body weight of TTE respectively. Administration lasted for 28 days. Overnight after the last day of administration, rats were sacrificed under mild anesthesia, and the blood sample collected for analyses of hematological parameters (PCV, Hb, RBC, WBC, PLT, MCHC, MCH, MCV, and lymphocytes), lipid profile (total cholesterol, triglycerides, LDL, and VLDL), and glucose levels. Results showed that administration of only CaC_2 to the rats caused a significant ($p<0.05$) reduction in PCV, HBC, WBC, PLT, MCHC, MCH, MCV, and lymphocytes but a significant ($p<0.05$) increase in neutrophils and the monocytes. However, the co-administration of CaC_2 and TTE significantly ($p<0.05$) reversed the dysregulation of hematological parameters, lipid profile, and glucose level. Taken together the reversal of these dysregulations shows that TTE has ameliorative effects against CaC_2-induced toxicities.

Keywords: Calcium carbide, *Tetrapleuratetraptera*dry fruit, hematological parameters, lipid profiles, ripening of fruits

NSBMB/UPH/MB/146

Histology of The Liver of Albino Rats Exposed To *Costus Afer* Aqueous Stem Extracts

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ABSTRACT

This study demonstrates the liver histology of wistar albino rats exposed to *Costus afer* stem extract. Twentyfour (24) rats were randomly divided into 4 groups labelled A, B, C and D and kept in a well-ventilated room. Group A served as control and these rats were treated with distilled water. Rats in the groups B, C, and D were treated with 3 different doses of the sample (500mg, 1,000mg and 1500mg/KgBW) respectively. Samples were administered once daily for 14, 28 and 42 days consecutively. Animals were sacrificed 24 hours after the last treatment. Histology done showed normal liver architecture at all doses of 14 and 28 days of administration. All treatment groups at 42 days of administration of the aquoeus leaf extract showed features of fatty degeneration of the hepatocytes and congested central veins. This study shows that *Costus afer* aqueous stem extract may be safe for the liver in the short term but this changes with longterm use irrespective of dosage.

Keywords: *Costus afer* aqueous stem extract hepatoprotective fatty degeneration

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Hepatoprotective Potential Of Leaf Extracts Of *Gmelina arborea* Against Paracetamol-Induced Liver Damage In Wistar Rats And Its Effect On Kidney Function Parameters

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ABSTRACT

Paracetamol (PCM) is an analgesic and antipyretic drug. However, deleterious effects such as hepatorenal toxicity may occur at high doses. This study investigated the protective potentials of different extracts of *Gmelina arborea* leaves against PCM-induced hepatorenal damage. Fifty wistar rats were distributed into ten groups of 5rats each. Groups 1 (normal control) and 2 (toxicant control) received food and water *ad libitum* while Groups 3 (standard control) and Group 10 (solvent control) received daily oral dose of 25mg/Kg weight (b.w.) of silymarin (reference drug) and 2ml/Kg b.w. of dimethyl sulfoxide, respectively for 14days with food and water *ad libitum*. Groups 4, 6 and 8 received daily oral dose of 200mg/Kg b.w. of n-hexane, acetone and ethanol extracts, respectively, whereas, Groups 5, 7 and 9 received 400 mg/Kg b.w. of the same extracts, respectively for 14days. 4hours after the last treatment on the 14^{th} day, hepatorenal damage was induced in all the experimental groups, except Group 1, with single oral dose of 3000mg/Kg body weight (b.w.) of PCM. All the experimental animals were sacrificed 30hours after induction and blood samples were obtained by cardiac puncture for biochemical assays. Results showed that some leaf extracts of *Gmelina arborea* caused a significant decrease ($p \leq 0.05$) in urea and creatinine concentrations in a dose-dependent manner. The activities of liver function biomarkers were also significantly reduced ($p \leq 0.05$) in the 200 and 400mg/Kg b.w n-hexane, acetone and ethanol extracts treated groups. These

findings suggest that the leaves of *Gmelina arborea* offered hepatorenal protection against PCM-induced injury.

Keywords: *Gmelina arborea*, paracetamol, silymarin, hepatorenal damage, liver function, urea, creatinine.

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Hepatoprotective Potential of Jatropha tanjorensis Leaf Extract in Carbon Tetrachloride-Induced Liver Injury in Wistar Albino Rats

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ABSTRACT

Hepatic insults resulting in liver disease represents a global health challenge with significant burden on individuals and healthcare systems. Natural plant-derived compounds have gained increasing attention for their potential therapeutic effects owing to many side effects and associated costs of orthodox therapies. This study investigated the hepatoprotective potential of ethanolic extract from Jatropha tanjorensis in animal models of carbon tetrachloride (CCl4)-induced liver injury. Twenty (20) rats weighing between 160 -200 g were used for the studies, and were randomly grouped into four of five rats each: group 1 was normal control; group 2 was untreated control, while groups 3 and 4 were treated with 200 and 400 mg/kg of the leaf extract for 14-day following administration of carbon tetrachloride. Liver function and morphology were assessed by measuring serum levels of hepatic enzymes including alanine aminotransferase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP) using RANDOX test kits, and liver histology. The results demonstrated that animals treated with CCl4 exhibited significantly elevated levels ($p < 0.05$) of hepatic enzymes and severe liver necrosis, indicative of liver injury in comparison to normal control rats. However, administration of Jatropha tanjorensis extract remarkably mitigated these adverse effects, by significantly ($p < 0.05$) reducing elevated enzyme levels in the treated groups compared to untreated control group. Furthermore, liver micrograms which showed visible balooning necrosis demonstrated by the presence of naked nuclei and the presence of inclusion bodies in the carbon tetrachloride-treated group were attenuated following treatment with the plant extract in a dose-dependent manner. These findings highlight the potential therapeutic value of Jatropha tanjorensis leaf extract, and may be useful in the alternative management of liver diseases. Further research is being undertaken to identify specific phytochemicals and elucidate their underlying mechanisms of action.

Key words: Jatropha tanjorensis, , hepatoprotective, hepatic enzymes, calcium tetrachloride

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Comparative Study Of Ld_{50} Determination Of Bisphenol A In Albino Wistar Rats Using Different Method

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ABSTRACT

The intake of chemical substances by man has increased dramatically, mostly as consumeables such as food and other household products. Bisphenol A (BPA) can elicit mild or severe toxicity, depending the extend of exposure. Bisphenol A is commonly used in most consumer goods and products. attention has been placed on BPA`s impact as an endocrine disruptor. The toxicity studies of BPA have been debated over the years and the LD_{50} values of Bisphenol A found in literature are different. This study attempt to determine the oral and subcutaneous LD_{50} of Bisphenol A in male and female albino wistar rats. The LD_{50} was estimated using lorkes, karbers arithmetic methods and grouping method. Graded doses of Bisphenol A ranging from 5000mg/Kg to 1000 Mg/kg body weight was for the oral administration, 500 - 100 Mg/kg body weight was used for subcutaneous administration. All rats were examined for mortality and clinical symptoms during the experiment. The results showed that the LD_{50} was significantly different between the male and female species using the 3 different methods, with the male rats having higher LD_{50} values. The values of the LD50 were higher for oral route of administration compared to the subcutaneous route and similar clinical sign changes were observed in the various experimental groups. The LD50 obtained is high, this finding implies that BPA can produce effects that lead to biochemical and functional impairments in cells, tissues and organs, this will in turn alter the biomolecules and functioning of the organism which if prolonged can be fatal.

Keywords: Bisphenol A, lethal $dose_{50}$, lorkes method, karbers method, subcutaneous administration, oral administration

NSBMB/UPH/MB/150

Biochemical Profiles In The Sera Of A Diabetic Rats Treated With Galli Acid And Metformin

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ABSTRACT

Diabetes is a growing global health concern and new treatment strategies are needed to bring about a permanent cure to the ailment, this study was designed to investigate the effects of metformin and gallic acid (GA) interventions on the lipid profile, urea and creatinine concentrations in the sera of diabetic female Wister rats. Adult female Wistar rats were induced with diabetic by single intraperitoneal injection of alloxan at a dose of 150 mg/kg body weight. Induction was confirmed after 7 days by significant elevation of blood sugar. Rats were treated with metformin, gallic acid, and a combination of metformin + gallic acid. After14 days of

treatments, it was observed that the gallic acid significantly decreased high density lipoprotein level, while metformin increases triacylglycerol level and decreases low density lipoprotein level, Metformin + Gallic acid combination significantly reduced the LDL level in the sera of the diabetic rats, the serum urea concentration of the diabetic control group was significantly increased ($P<0.05$) compared to the normal control. In contrast, the serum urea concentrations of the diabetic rats that received metformin or gallic acid were significantly decreased ($P<0.05$) unlike the group that received combination of metformin and gallic acid compared to the diabetic control group. On the contrary, there were no significant changes ($P>0.05$) in the serum creatinine concentrations of all the rats across the groups. Put together and judging by the outcomes of this study, metformin or gallic acid mitigated alloxan induced diabetes changes in the kidney better than their combination.

Keywords: Diabetes Mellitus, Urea, Creatinine. Metformin, Gallic acid, Alloxan, Lipid profile

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Cucumeropsis mannii Seed Oil (white-seed melon) Restores Testicular Mitochondrial Dysfunctions by Modulating the Activities of Dysregulated Testicular Mitochondrial Enzymes inMale Albino Rats Exposed to Bisphenol-A Toxicity.

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ABSTRACT

A GC-MS analysis of *Cucumeropsis mannii* seed oil ("white-seed melon" or "African horned cucumber.") has revealed the presence of numerous phytochemicals, including fatty acids such as oleic acid, linoleic acid, palmitic acid, stearic acid, and myristic acid. Additionally, the analysis detected phytosterols, specifically β-sitosterol, campesterol, and stigmasterol, as well as tocopherols, including α-tocopherol, γ-tocopherol, and δ-tocopherol, among other compounds, highlighting its potential in ameliorating Bisphenol-A-induced biochemical toxicity. Rats were randomly assigned to six experimental groups (n=6): A, B, C, D, E, and F. Group A received 1 ml of olive oil only, while group B rats were orally administered 100 ml/kg body weight (bw) of BPA. Group C received 7.5 ml/kg bw of *Cucumeropsis mannii* seed oil (CMSO) orally. Group D rats were pre-administered 100 ml/kg bw of BPA and were subsequently treated with 7.5 ml/kg bw of CMSO, while group E received 5 ml/kg bw of CMSO after BPA pre-administration. Group F rats were pre-administered 100 mg/kg bw of BPA and were treated with 2.5 ml/kg bw of CMSO. The study extended over a 6-week period, with uniform diet and water exposure. Standard methods were employed to assess various mitochondrial enzymes, mitochondrial membrane potential (MMP), mitochondria testicular protein, and rat body weight. The study's results indicate that the administration of *Cucumeropsis mannii* seed oil (white-seed Melon oil) effectively restored several crucial aspects impacted by Bisphenol-A induction in rats. Specifically, the study revealed that the levels of certain mitochondrial enzymes, including succinate dehydrogenase, malate dehydrogenase, isocitrate dehydrogenase, NADH dehydrogenase, and monoamine oxidase, were restored to their normal functioning states. Furthermore, mitochondrial membrane potential (MMP), mitochondria testicular protein levels, and rat body weight were returned to their baseline values. The data obtained from this study showed the remarkable restorative potential of *Cucumeropsis mannii* seed oil in mitigating the adverse effects induced by Bisphenol-A in rats. Notably, the administration of this seed oil effectively reinstated the normal functioning of vital mitochondrial enzymes, such as succinate dehydrogenase, malate dehydrogenase, isocitrate dehydrogenase, NADH dehydrogenase, and monoamine oxidase.

Furthermore, it successfully normalized key parameters, including mitochondrial membrane potential (MMP), mitochondria testicular protein levels, and the body weight of the experimental subjects.

Keywords: Bisphenol-A, *Cucumeropsis mannii* seed oil, mitochondrial enzymes.

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Effect Of Ethanol Leaf Extract Of *Moringa Oleifera* On D-Galactose Induced Changes In Liver Function Markers Of Wister Albino Rats

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ABSTRACT

The aging process is linked to several morphological and functional modifications in the liver. Thus, understanding the mechanisms underlying age-related liver susceptibility and possible therapeutic treatment is very crucial. To examine the serum liver enzymes in Wister albino rats, this study employed D-galactose- induced aging as a model. The liver enzymes were analysed using standard methods. Thirty (30) male albino rats were randomly assigned into five (5) groups of six (6) animals each and fed with normal diets. Group 1 and 5 which served as the young and adult control received basal diet only while the others were administered D-galactose (150mg/kg) and *Moringa oleifera* extract (MOLE-200mg/kg &- 400mg/kg) respectively for eight (8) weeks. At the end of the study animals were sacrificed and blood sample were collected. At week 2, results showed that treatment with high dose (HD) of MOLE resulted in a significant ($p<0.05$) decrease in Bilirubin and ALT concentration relative to the D-galactose only treated group. At week 8, treatments with HD and LD of MOLE resulted in a significant ($p<0.05$) decrease in AST, ALT, ALP and Bilirubin concentration relative to the D-galactose only treated group, Conversely, Total protein concentration was significantly ($p<0.05$) increased following treatment with both HD and LD of MOLE relative to the D-galactose only treated group. These results suggest that *Moringa oleifera* leaf extract exerts some protective interventions against age-related liver dysfunctions.

Keywords: Ageing, D-galactose, liver enzymes and *Moringa oleifera* leaf extract.

NSBMB/UPH/MB/153

Hepatoprotective Potentials Of Aqueous Leaf And Seed Extracts Of Jackfruit (Artocarpus Heterophyllus) On Testosterone Propionate Induced Benign Prostatic Hyperplasia In Male Wistar Rats.

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ABSTRACT

This study evaluated the hepatoprotective potentials of aqueous leaf and seed extracts of *Artocarpus heterophyllus* on testosterone propionate induced benign prostatic hyperplasia in male Wistar Rat. Male Wistar rats of 100-125g and 100 in number were obtained from the

Department of Pharmacology, University of Port Harcourt animal house and was grouped into 10 of 10 rats each. The various groups were fed and administered with various concentrations (100mg/kg, 200mg/kg, 300mg/kg and 200mg/kg combined extract) of the leaves and seeds extracts of *A.heterophyllus*. The hepatoprotective potentials was studied by evaluating the liver function parameters on the male Wistar rats by day 21, 42 and 63 of the experiment using standard laboratory methods. Obtained results showed significantly ($p< 0.05$) increased ALP levels (401.57±0.85) on administration of testosterone propionate in group 2 (induced not treated group) day 21, as against the normal control group (294.57±0.06), while group 5 (Rats induced with TP (4 mg/kg) and administered 200 mg/kg of aqueous extract of *A.heterophyllus* leaves) revealed minimal level of ALP 293.47±0.006 by day 63. Minimum values for AST 23.00±0.51 was seen in group 8 day 21) with maximum activity 76.82±0.09 seen in group 1 day 21, ALT minimum level 7.67±0.33 was observed in group 4 day 21, while maximum levels 38.41±0.51 was seen in group 2 day 21, Albumin minimum level 17.87±0.09 was seen in group 2 day 63, with maximum level 31.13±0.18 observed in group 8 day 63, while minimum Total Protein 26.31±0.84 was shown in group 2 day 63 and maximum 64.63±0.49 in group 8 day 42. Obtained values from groups 5, 6, 9 and 10 were shown to be significantly different when compared with the negative control in group 2 but not significantly different with the normal control group 1 and standard drug control group 3, hence depicting a more stabilized and hepatoprotective system in the plant extract treated groups compared to the negative control (group 2) at day 21. However, groups 5 was shown to have higher hepatoprotective potentials by day 42 followed by group 10.

Keyword: *Arthocarpus heterophyllus*, Benign prostatic hyperplasia, Hepatotoxicity, Testosterone propionate.

NSBMB/UPH/MB/154

Modulation Of Crude Oil Soot Induced Oxidative Stress, Inflammation And Haematotoxicity In Wistar Rat Administered *Curcuma longa* Rhizome Extract

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ABSTRACT

Crude oil soot is released into the environment during incomplete combustion of crude oil; a practice common in oil producing states in Nigeria. This study investigated the effects of *Curcuma longa* rhizome extract against crude oil soot-induced oxidative stress, inflammation and haematotoxicity in Wistar rats. Twenty-eight mature female rats were divided into seven groups, each comprising four rats. Group 1 served as the normal control, while Groups 2, 3, and 4 were exposed to crude oil soot for 7, 14, and 28 days, respectively. Groups 5, 6, and 7 were administered 500 mg/kg of *Curcuma longa* and exposed to soot for 7, 14, and 28 days, respectively. Soot exposure occurred daily for 30 minutes. Significantly increased malondialdehyde coupled with decreased catalase, superoxide dismutase, glutathione peroxidase and glutathione levels in Groups 2, 3 and 4 compared to the normal control showed oxidative stress induced by crude oil soot. Soot induced inflammation was evidenced in significantly ($p<0.05$) increased levels of TNF-α and COX in Groups 2, 3, and 4 compared

with Group 1. The red blood cell and platelet count with related parameters, white blood cell count, lymphocytes, eosinophils and basophils were significantly decreased in Groups 2, 3 and 4 when compared to Group 1. *Curcuma longa* rhizome extract administered to Groups 4, 5 and 6 significantly improved the parameters of oxidative stress, inflammatory and haematology when compared to the soot exposed Groups 2, 3 and 4 respectively. The study has demonstrated that exposure of Wistar rats to crude oil soot exhibited deleterious effect evident in oxidative stress, inflammation and haematotoxicity which were positively modulated by *Curcuma longa* rhizome extract. The protective role of *Curcuma longa* rhizome extract against crude oil induced toxicity may be attributed to its rich array of phytochemicals exhibiting antioxidant activity.

Keywords: Crude oil soot, *Curcuma longa*, Oxidative stress, Inflammation, Haematology.

NSBMB/UPH/MB/155

Chemical Composition and Toxicity Profile of Essential Oil of *Acanthus montanus* Leaves on some Biochemical Indices of Female Wistar Rats.

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ABSTRACT

The chemical compositions, of essential oil extracted from the leaves of *Acanthus montanus* via hydro-distillation was analysed using gas chromatography-Mass spectrometry. Thirty compounds were present in the essential oil with the major compounds being: methyl ester 9-Octadecenoic acid (33.38%) followed by 9,12-Octadecadienoic acid (21.45%), n-Hexadecenoic acid (14.61%) and n –Eicosane (6.61%). Thirty-five (35) female Wistar rats weighing between 160-200g were divided into seven groups of five rats each. Group A served as Control and were not exposed to any insecticide; B1, B2, B3 were exposed to 300, 500 and 700mg/kg doses of essential oil, while C1, C2, C3 were exposed to various doses of Sniper insecticide with active ingredient:1000g/litre of 2,3-dichlorovinyl dimethyl phosphate (DDVP), respectively. Animals were exposed to treatments for a period of 5 hours daily for 28 days in a closed chamber with adequate ventilation, and were fed *ad libitum* with standard feed and drinking water. After twenty-eight days of exposure, they were sacrificed after an overnight fast under ketamine (50mg/ml) injection at 2mg/kg body weight as anaesthesia. Blood samples were collected through cardiac puncture and analysed for biochemical indices. Lipid profile parameters: total cholesterol (TCHOL), low density lipoprotein (LDL), triglycerides (TG), very low-density lipoprotein (VLDL-C), high density lipoprotein (HDL-C), and reproductive hormones (progesterone, luteinizing hormone, and oestradiol). Concentrations were determined using enzyme-linked immunosorbent assay (ELISA). A significant ($p<0.05$) increase in lipid profile indices (TCHOL, TG, VLDL, and LDL) was observed, while HDL significantly ($p<0.05$) decreased in the groups exposed to Sniper relative to the control group. Progesterone, luteinizing hormone, and oestradiol concentrations significantly ($p<0.05$) decreased in rats exposed to Sniper insecticide more than in rats exposed to essential oil relative to the control group. The observation from this study suggests that, the essential oil from

Acanthus montanus leaves may serve as milder alternative to Sniper insecticide for insects and pest control.

Keywords: Toxicity, Composition, hormones, reproduction, oxidative stress, metabolism.

NSBMB/UPH/MB/156

Evaluation Of Lipid Profile Of Four Most Consumed Herbal Drinks In Uburu On Wister Albino Rats

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ABSTRACT

Owing to life style changes and high cost of living alcoholism is now high due to proliferation of herbal drinks which consumers claim to be sex enhancer and liver cleansing agent without scientific proofs. Chronic consumption of herbal-based alcoholic beverages by school children and youth remains a serious public health issue in Uburu South East Nigeria. Our study evaluated the lipid profile of four different herbal bitters mostly consumed in South East Nigeria (Akpaka, Odogwu, ballamour and Confam bitters) on Wister albino rats. A total of 30 male rats were randomly divided into 5 groups labelled A, B, C, D and E. Group A served as control that were administered with distilled water. While the albino rats in the groups B, C, D and E were given 50mL/Kgbw of Akpaka, Odogwu, Ballamour and Confam respectively once daily for 28days via oral intubation. Animals were fasted and sacrificed after the 28th day of administration. Blood samples were collected into sample bottles for biochemical analysis. Bitters administration significantly ($p < 0.05$) increase plasma triglyceride levels, plasma total cholesterol levels, and low density lipoproteins (LDL) levels in the groups that received Akpaka, Odogwu, Ballamour and Confam bitters with significant ($P<0.05$) decrease of high density lipoprotein (HDL) level when compared to the control. Our results showed that alcoholic bitters such as (Akpaka, Odogwu, ballamour and Confam) alter lipid profile of rats and should be consumed with causion because high doses can lead to cardiovascular and liver diseases.

Key words: Sex enhancer, alcoholic bitters, and herbal based

NSBMB/UPH/MB/157

Effect of *Cnidoscolus aconitifolius* Aqueous Leaf Extract on Liver and Kidney Profile in Carbon tetrachloride Induced-toxicity in Wistar Rats

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ABSTRACT

Protective effect of *Cnidoscolus aconitifolius* aqueous leaf extract on liver and kidney profile in carbon tetrachloride induced toxicity in Wistar rats was investigated. Thirty-six adult male Wistar rats (91-185g) were housed in plastic cages of six groups with six animals in each. Group one fed with normal rat chow (control). Group two to six were administered CCl_4 subcutaneously on day twenty-one. Group three was administered vitamin C orally on daily basis for twenty-one days, group four, five and six took 50, 75 and 100mg/kgbw respectively, of extract dose orally for twenty-one days before administration of CCl_4. Standard methods were employed for all analyses. Proximate analysis of the leaf extract revealed the presence of moisture, ash, lipid, crude protein, crude fibre and carbohydrate at percentages ranging from 0.86 to 82.11%. In comparison to the disease control (group two) and normal control (group one) rats, administration of the extract dose (50, 75 and 100mg/kgbw) dependently lowered creatinine, albumin, calcium, potassium, alanine transaminase (ALT), aspartate transaminase (AST) and total bilirubin. There was no significant difference ($p<0.05$) in the magnesium concentrations of rats treated with the leaf extract of *Cnidoscolus aconitifolius*. The 50 and 75mg/kgbw extract doses provided better protection. The result of this study clearly demonstrated the hepatorenal protective effect of *Cnidoscolus aconitifolius* leaf extract against carbon tetrachloride induced toxicity in Wistar rats.

Keywords: *Cnidoscolus aconitifolius*, Proximate analysis, Hepatorenal protective, Wistar rats, leaf extracts, Carbon tetrachloride (CCl_4).

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Studies on the effect of Standard Antimalarial Drugs in Experimental Animals

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ABSTRACT

This study assessed the effects of malaria treatment on mice infected with *Plasmodium berghei* and the molecular mechanism in mitigating the progress of *Plasmodium* parasite using dihydrofolate reductase as a case study. Thirty mice were randomly divided into six groups: group 1 (normal control), group 2 (disease control), groups 3 to 5 received sulfadoxine, artesunate and chloroquine, respectively and group 6 treated with combination of sulfadoxine, artesunate and chloroquine. The biochemical parameters and the molecular docking were determined using standard methods. From the results, there exist significant ($p<0.05$) decrease in percentage parasitaemia in all the treated groups, as compared to the disease control. The haemoglobin (Hb) level had significant ($p<0.05$) decrease in all the infected groups (groups 2-6 {12.23 mg/dl, 12.277 mg/dl, 14.00 mg/dl, 1467 mg/dl, and 14.76 mg/dl, respectively}) when compared with the normal control (19 mg/dl). A significant ($p<0.05$) reduction was observed in the MCH of all infected groups (except groups 4) when compared with the normal control (14.70 mg/dl). A reduction in MCH was observed in group 5 (11.23 mg/dl). The PCV and RBC present significant ($p<0.05$) in all the infected groups when compared with the normal control. There exist non-significant ($p>0.05$) difference in the level of total cholesterol between the

treated groups, the disease control (129.25 mg/dl) and the normal control (152.76 mg/dl), however, significant (*p<0.05*) difference was observed between group 3 (118.10 mg/dl) and group 6 (180.43 mg/dl). The concentration of triacylglycerol showed non-significant (*p>0.05*) change between the treated groups, the disease control (160.89 mg/dl) and the normal control (166.81 mg/dl). There exist non-significant (*p>0.05*) change in the level of HDL between the normal control (32.18 mg/dl) and the disease control (33.36 mg/dl), and between the controls and the treated groups, except group 3 (49.63 mg/dl) with significant (*p<0.05*) increase in HDL. The level of LDL showed non-significant (*p>0.05*) change between the normal control (129.40 mg/dl) and all other infected groups, except group 6 (94.32 mg/dl) with significant (*p<0.05*) reduction in LDL when compared to the normal control. The molecular docking presented positive interactions of amodiaquine, chloroquine, lumefantriene and sulfadoxine compounds with *Plasmodium berghei's* dihydrofolate reductase.

Keywords: P. berghei, standard drugs, haematology, lipid profile, molecular docking.

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Protective Potential of combined extract of Piper guineese (uziza) leaf and Zingiber officinale (Ginger) in Aluminum chloride- induced dementia in male Wistar rats

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ABSTRACT

This study aimed to evaluate the protective potential of the combined extract of Piper guineese (uziza) leaf and Zingiber officinale (Ginger) in Aluminum chloride-induced dementia in Wister rats. A total of 57 Wistar rats weighing 120-150g were used for the study. 30 rats were randomly divided into six groups of 5 rats each. Group 1(control) were given distilled water, Group 2 (120mg/kg BW, $AlCl_3$), Group 3(800mg/kg BW, combined extract only), Group 4 and 5 (400mg/kg BW and 800mg/kg BW, combined extract+ $AlCl_3$ 120mg/kg BW), Group 6 (standard drug + $AlCl_3$ 120mg/kg BW). Twenty-seven rats were used to determine the median lethal dose (LD 50) of the combined extract. Animals were treated with $AlCl_3$ (120 mg/kg BW, orally) once daily for 28days. The combined extract of 1:1 ratio was given 60mins before the administration of $AlCl_3$ for 28days (as Protective). Memory assessment was performed on the 28th day of the study, whereas the biochemical parameters were performed at the end of the study then the animals were sacrificed and brain tissue homogenate was prepared. Treatment with $AlCl_3$ (120 my/kg BW) showed significant increase ($p < 0.05$) in pro-inflammatory cytokines such as IL-6 (25.51 ± 1.29), IL-1β (1.29 ± 0.03) and TNF-α (78.67 ± 2.44) when compared to the control group; IL-6 (14.62 ± 0.84), IL-1β (0.29 ± 0.03) and TNF-α (41.68 ± 1.97). However, Treatment with combined extract together with AlCl3 showed a significant decrease in pro-inflammatory cytokines; IL-6 (18.99 ± 0.30), IL-1β (0.95 ± 0.04) and TNF-α (58.06 ± 2.89) when compared to $AlCl_3$ group. Administration of aluminum chloride significantly elevated ($p < 0.05$) the activities of NAD(P)H oxidases and also increased significantly ($p<0.05$) the levels of malondialdehyde while the activities of superoxide dismutase, catalase, glutathione peroxidase and glutathione levels were significantly ($p < 0.05$) decreased. Pretreatments with Piper guineese and Zingiber officinale inhibitors of NOX was

effective in ameliorating AlCl3-induced dementia by reducing prooxidant biomarkers, NADPH, Malonaldehyde and levels of antioxidant. Administration of aluminum chloride 120mg/kg significantly ($p \leq 0.05$) increased brain acetylcholinesterase activity and beta amyloid concentration compared to the control group and also decreased brain acetylcholine content compared to the control group.

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Exposure to pharmaceutical drug benzhexol alter the biochemical and oxidative stress parameters in rat

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ABSTRACT

The present study evaluated the effects of sublethal doses of bexhexol on biochemical and oxidative stress parameters in albino rat. Sixty albino rats, 11-13 weeks old and weight 160.85±2.75g were randomized into five groups (A – D) of 15 rats in each group. Each group was further replicated into three with each replicate containing 5 rats. Groups Group A served and received distilled water. Groups B, C and D received 10. 20 and 30 mg/kg benzhexol respectively for 14 days. The drugs were withdrawn after 14 days to monitor the recovery process. Our results indicate that catalase and superoxide dismutase activity significantly decreased in all the three drug doses compared with the control. Lipid peroxidation (LPO), glutathione peroxidase (GPx), glutathione reductase (GR) and reduced glutathione (GSH) activities significantly increased in the rat after 14 days' drug administration. While the values of the GPx, GR and GSH were same with the control after 7 –days removal, that of LPO abated following a 7-day withdrawal from the drug. Alanine aminotransferase (ALT), Aspartate aminotransferase (AST), Alkaline phosphatase (ALP), Acid phosphatase (ACP), blood creatinine, bilirubin increased significantly in blood of rats administered the drug. The activity of ALT, AST, ALP and ACP, creatinine and bilirubin abated after 7 days' recovery. Benzhexol altered the biochemical and oxidative stress parameters in rat and should be used with caution in the environment.

Keywords: Drug, biochemistry, oxidative stress, rat

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The effect of methanol extract of *Ficus exasperata stem* bark and leaves on liver function test and histopathological changes in 1,2-dimethyl hydrazine induced liver toxicity.

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ABSTRACT

This study investigated the hepatoprotective effects of *Ficus exasperata* leaf extract and stem bark extract against 1,2-dimethylhydrazine (DMH)-induced liver toxicity in male Wistar rats. A total of 35 rats were divided into seven groups. Group I served as the control, group 2 was

treated with the leaf extract only (400mg/kg body weight), group 3 received stem bark extract (250mg/kg body weight), group 4 was treated with DMH only (30mg/kg body weight), group 5, 6 and 7 were given DMH subcutaneously (30mg/kg body weight) and later treated with leaf extract (400mg/kg body weight), stem bark extract (250mg/kg body weight) and combination of leaf (200mg/kg body weight) and stem bark extract (125mg/kg body weight) respectively. Liver function was assessed through biochemical analysis of alanine transaminase (ALT), aspartate transferase (AST), albumin, total bilirubin, and direct bilirubin levels, while liver histopathology was evaluated using hematoxylin and eosin (H&E) staining. Biochemical analysis revealed significant variations in ALT, AST, albumin, total bilirubin, and direct bilirubin levels across the different treatment groups. Notably, Group 4, treated with DMH alone, exhibited markedly elevated ALT levels (48.08±6.211 IU/L) and albumin levels (95.50±36.72 mg%), indicative of severe liver injury. Conversely, Group 6, treated with DMH and stem bark extract, showed relatively lower ALT levels (26.71±3.807 IU/L), suggesting a potential hepatoprotective effect of the stem bark. Histopathological examination revealed varying degrees of liver pathology, with DMH-induced liver damage characterized by sinusoidal Kupffer cell mobilization and periportal infiltrates of inflammatory and plasma cells. Overall, the findings suggest that *Ficus exasperata* leaf and stem bark extracts may possess hepatoprotective properties against DMH-induced liver toxicity, with the stem bark extract showing promising protective effects.

Keywords: 1,2-dimethylhydrazine, *Ficus exasperata*, liver damage, histopathology.

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Invitro Antioxidant Potential Of *Andrographis paniculata* Extracts

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ABSTRACT

Andrographis paniculata is one of the well known herbaceous plants with many therapeutic properties. It was used in folklore medicine to treat and manage different pathological conditions such as high blood pressure, diabetes, cancer, malaria, cough e.t.c. in Asia, America, and Africa. The therapeutic properties of *Andrographis paniculata* has been traced to the presence of some bioactive compounds in the plant. This study was carried out to investigate the antioxidant potentials of different extracts (aqueous, carbonated drink and ethanolic extract) of *Andrographis paniculata* using standard methods. The free radical scavenging potential of *Andrographis paniculata* extracts was assayed using DPPH, FRAP, TAC and hydroxyl free radical assays. Comparative analysis of the data showed that the IC_{50} values for the three *Andrographis paniculata* extracts (aqueous extract; DPPH - 8.87, FRAP - 0.68, TAC - 0.57 : carbonated drink extract; DPPH - 10.17, FRAP - 0.678, TAC - 0.41 : ethanolic extract; DPPH - 0.42, FRAP - 0.68, TAC - 0.35) are lower than that of the standard (ascorbic acid; DPPH - 0.71, FRAP - 0.83, TAC - 0.65), with the exception of DPPH assay of the plant aqueous and carbonated drink extracts where the IC_{50} value of the extracts is higher than that of the standard. The low IC_{50} values indicated that the plant extracts have more antioxidant activity than the standard, invariably, the plant extracts have more antioxidant potential. Also, of the three

extracts of *Andrographis paniculata*, the ethanolic extract has more antioxidant potential compared to that of aqueous and carbonated drink extract.

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Health Impact Assessment of Polychlorinated Biphenyls and Polyaromatic Hydrocarbons In Selected Sites In Edo State, Southern Nigeria

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ABSTRACT

Polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs) are hazardous primary organic pollutants classified as persistent organic pollutants (POPs). They cause health complications such as eye irritation**,** skin rashes, acne, fatigue**,** jaundice, cancer**,** nausea/vomiting, liver damage, cataract, dizziness, lungs damage, allergic skin reaction, increased incidence of cardiovascular diseases such as, hypertension, respiratory tract infection such as asthma and bronchitis. The study locations comprised of Sapele road and Uniben transmission substations, Ekehuan road and Aduwawa urban transformer site locations, Otofure and Ikhueniro dumpsite locations and rural transformer locations, Okhuaihe, Ugoneki and Auchi road. The health implications of the levels of PAHs and PCBs at these locations were assessed by administering questionnaire designed by Community Health Department, University of Benin Teaching Hospital to residents and workers around the sampled locations. A total of seventy (70) respondents were interviewed concerning their experience of symptoms suggestive of exposure to PAHs and PCBs. Majority of the respondents reported having neurological and respiratory symptoms suggestive of exposure to PCBs and PAHs. Easily tired/fatigued was the most common neurological symptom experienced by a higher proportion 43 (61.4%) of the respondents. For respiratory symptoms, 25 (34.3%) experienced chest tightness, 24 (34.3%) experienced shortness of breath, 22 (31.4%) experienced wheezing in the chest and 22 (31.4%) reported coughing first thing in the morning. On physical examination of the respondents, skin rashes and acneform eruptions were the most prevalent dermatological findings 26 (37.1%). Over one third (35.7%) of the respondents were hypertensive. Health impact assessment reported symptoms suggestive of exposure to PAHs and PCBs, with neurological and respiratory symptoms being the most prevalent.

Keywords: Health Impact Assessment, Polychlorinated biphenyls, Polycyclic Aromatic Hydrocarbons, Edo State, Southern Nigeria

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Nephroprotective Effect of Ipomoea Cairica Leaf Extract Against Acetaminophen Nephrotoxic Effect In Rats Viz Antioxidant And Anti-Inflammatory Activities

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ABSTRACT

This study aimed to evaluate the nephroprotective effect of I. cairica leaf extract against the nephrotoxic effect of acetaminophen in rats. Thirty-five rats were randomly divided into five groups (I, II, III, IV, and V) of seven rats each. I: normal control; II: orally administered 2000 mg/kg of acetaminophen (ACET); III: orally administered 100 m/kg Methanolic extract of Ipomoea cairica (MEIC) for 14 days before single dose administration of ACET; IV: orally administered 250 mg/kg of MEIC for 12 consecutive days before single dose administration of ACER; V: orally administered 250 mg/kg of MEIC for 14 consecutive days. Animals were sacrificed 24 hours after the last administration. Blood was collected and processed for markers of renal function and electrolytes, the kidney was excised and processed for antioxidant, oxidative stress, and anti-inflammatory levels.The results showed that MEIC at the two administered doses (100 and 250 mg/kg) caused a significant decrease ($P<0.05$) in the concentration of creatinine, urea, and uric acid when compared to the untreated group. Treatment with MEIC caused an insignificant increase ($P>0.05$) in sodium, potassium, and chloride ions and an increase in potassium ions. The concentration of glutathione (GSH) and the activities of MPO, NOR, XO, and MPO in the renal tissue of rats in the control group were also evaluated. MEIC was able to improve the ability of the kidney to clear creatinine from the blood. The study showed that the MEIC significantly improved renal function to clear uremia, implicated in kidney stones and cancer

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Neuroprotective Effects of Elaeis guineensis Fruit Oil on Monosodium Glutamate-Induced Neurotoxicity in Wistar Rats

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ABSTRACT

This research work aims to investigate the neuroprotective effects of *Elaeis guineensis* fruit oil on monosodium glutamate-induced neurotoxicity in male Wistar rats. Male Wistar rats were divided into five groups as follows: control group (administered vehicle), group II (administered 6g/kg of monosodium glutamate (MSG)), group III (administered 2 ml/kg of E. guineensis fruit oil (EGFO) for 7 days before co-administration with MSG for 14 more days); group IV (administered 4 ml/kg of EGFO for 7 days before co-administration with MSG for 14 more days). Animals were sacrificed 24 hrs after the last administration and the brain was excised and processed for the following biochemical assays- malondialdehyde (MDA), glutathione (GSH), catalase (CAT), superoxide dismutase (SOD), nitric oxide (NO), acetylcholinesterase (AChE). The results showed that MSG at the dose administered caused a significant alteration in all the biochemical markers evaluated as compared to the control group ($P<0.05$). pre-administration of EGFO was able to significantly prevent the biochemical toxicity of MSG in the brain of male Wistar rats. In conclusion, the present findings collectively suggest that *E. guineensis* fruit oil provides protection against the neurotoxic effect of monosodium glutamate and might be due to some of the reported antioxidants present in it.

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Exploring the Therapeutic Potential of Bromelain from Pineapple Fruit: Enzymatic Activity, Stability, and Antibiotic Synergy

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ABSTRACT

Bromelain, an endopeptidase abundantly present in various parts of the pineapple plant, has garnered attention for its numerous health and industrial benefits. This study aimed to explore the therapeutic potential of bromelain extracted from pineapple fruit (*Ananas comosus*) by investigating its enzymatic activity, stability, and antibiotic-enhancing effects. Bromelain was successfully extracted, assayed as crude enzyme, and purified by ammonium sulphate precipitation and dialysis, resulting in a 2.33-fold purification. Optimum enzymatic activity was observed at 40°C, with stability maintained between 30-60°C and a decline at 70°C. pH studies revealed maximal activity at pH 7.0, with decreased activity at extreme pH values. Furthermore, the antibiotic-enhancing effects of bromelain were evaluated against clinically relevant bacteria, *Staphylococcus aureus* and *Staphylococcus epidermidis*, demonstrating significant increases in the absorption of specific antibiotics. Additionally, bromelain exhibited inherent antibacterial properties and synergistic effects when combined with a wide range of antibiotics such as Ampiclox, Erythromycin, Amoxicillin, Septrin, Augmentin and Tarivid, with *Staphylococcus aureus* showing greater susceptibility compared to *Staphylococcus epidermidis*. These findings underscore the potential of bromelain as an antimicrobial agent, particularly against gram-negative bacteria. Further research is warranted to elucidate its mechanism of action and explore its clinical applications in combating bacterial infections.

Keywords: Bromelain, Pineapple fruit, Enzymatic activity, Antibiotic potential, Gram-negative and positive bacteria.

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Effects of *Cucumeropsis mannii* Seed Oil on Pre-treatment on the Hormonal Profile of Cyclophosphamide- Induced Reproductive Toxicity in Rats.

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ABSTRACT

The aim of this study was to determine the pre-treatment effects of *Cucumeropsis mannii* seed oil (CMSO) on the hormonal profile of rats treated with cyclophosphamide. Blood samples

were collected from rats through cardiac puncture and used for the analysis of serum testosterone while testes and epididymis of rats removed upon sacrifice and cut into smaller tissues at a pH of 7.4 and homogenized. The homogenates were spinned at 10,000 rpm for 10 minutes and supernatants used for follicle stimulating hormone and luteinizing hormonal profile analysis. Serum testosterone, follicle stimulating hormone and leutinizing hormone in the testes and epididymis were determined using Enzyme Linked Immunosorbent Assay (ELISA). In the testis and epididymis of cyclophosphamide-treated albino rats, the pre-treatment effects of CMSO on the hormonal levels, such as follicle stimulating hormone, luteinizing hormone and testosterone, were assessed. The results showed a significant decrease ($p<0.05$) in the hormonal levels in the infected and untreated groups (CPA) when compared to standard control group (POV), which received treatment with the standard medication poviron and the test groups. However, pretreatment with CMSO exerted significant increase ($p<0.05$) in the levels of testicular FSH, LH and serum testosterone with the value of 0.32±0.03, 0.17±0.01 and 3.2±0.01 respectively. The effects of CMSO in the test groups demonstrated that CMSO was more effective at raising the hormonal levels of testosterone, luteinizing hormone and follicle stimulating hormone. Conclusively, this study shows that *Cucumeropsis mannii* has significantly increased ($p<0.05$) the hormonal level of groups administered. Such significant data (as obtained in this study) can be extrapolated by humans with the view of boosting the reproductive hormones in humans.

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Anti- Infertility And Antioxidative Property Of Tiger Nut Milk On Oligozoospermia Induced Infertility By Anti-Hypertensive Drugs In Male Albino Rats

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ABSTRACT

Hypertension one of the major public health concerns and an important area of studies due to its high prevalence and major risk factor for cardiovascular diseases. Conventional drugs used for the treatment of hypertensive patients are not without side effects and one of such is infertility. *Cyperus Esculentus* L (Tiger nut) has been reported to be beneficial against the infertility caused by anti- hypertensive drugs. The aim of this research is to investigate the anti - infertility and antioxidative property of tiger nut milk on oligozoospermia induced infertility by anti - hypertensive drugs in male albino rats. Forty – eight male Albino rats weighing 200 - 240g were grouped into eight groups, with 6 rats in each group. Group 1 control were given distilled water; Group 2 - Amlodipine (0.07mg/Kg B.W); Group 3-Bisoprolol (0.07mg /Kg B.W); Group 4 - Amlodipine + Bisoprolol; Group 5 - Amlodipine + Tiger nut milk; Group 6- Bisoprolol + Tiger nut milk; Group 7- Amlodipine + Bisoprolol + Tiger nut; Group 8 - Tiger nut milk. At the end of the treatment, the rats were fasted overnight, weighed and sacrificed. Blood samples were collected via cardiac puncture into appropriately labeled tubes and stored for further biochemical analysis. The findings of this study revealed that there was a significant ($p > 0.05$) reduction in luteinizing hormone and testosterone in the group treated with amlodipine as compared with the control. Also, there was a significant reduction in the antioxidants level (SOD, CAT and GSH) in the groups administered with amlodipine and

amlodipine + bisoprolol in testis and plasma as compared with control. MDA level increase significantly in all the groups treated with amlodipine and bisoprolol. Tiger nut milk could be another alternative medicine in the treatment of infertility in men, or infertility caused by antihypertensive drugs.

Keywords: Antihypertensive drugs, Oligozoospermia, Testosterone, Tiger nut milk, anti-oxidants.

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The Effect Of Ethanolic Leaf Extracts Of *Aspilia africana* (Hemorrhage Plant) On The Histological Parameters Of Male Albino Wistar Rats

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ABSTRACT

This study was done to investigate the effect of ethanolic leaf extract of *Aspilia Africana* on serum lipid profile – Total cholesterol (TC), Triglycerol (TG), Low density Lipoprotein cholesterol (LDL-C), High density lipoprotein cholesterol (HDL-C) and Very low density Lipoprotein cholesterol (VLDL-C) to ascertain possible cardiovascular effects on forty (48) male Albino wistar rats. The ethanolic leaf extract was gotten through soaking of 150g of blended air-dried *Aspilia Africana* leaf in 700ml of ethanol and kept for about 48hours for proper extraction of the plant active components. Forty eight (48) male albino wistar rats weighing (150 -180) g were used for this study. They were placed in four groups of 12 per a group (1 -4), using group 1 as the control. Extract administration to animals in groups (2 – 4) was done for 28 days, Group 2 was administered with 500mg/kg, Group 3 was administered 1000mg per kg of the extract, group 4 was administered 2000 mg/kg of the extract while those in the control group were fed with clean water and poultry feed. At the end of the administration period, dissection and blood collection was done after 24hours of fasting.Organs (heart, kidney and liver) were extracted and weighed and the serum lipid profile was estimated afterwards. It was observed from the result that HDL –C in the treatment groups (2,3,4) increased significantly relative to control at $P<0.05$ in the 28days treatment. Serum TC, T G and VLDL were increased significantly, there was no significant difference in serum low density lipoprotein (LDL). From the result of this study, it is concluded that the extract is safe and can be useful in the management of heart related disease and other ailments.

Keyword: Medicinal plants, *Aspilia Africana*, serum lipid, cardiovascular diseases, Albino Wistar Rats.

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Hematinic Potentials of Polyphenols from *Spondias mombin* Linn. Stembark in Malaria-induced Anaemia.

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ABSTRACT

Polyphenols are known for their anti-inflammatory, antioxidant and immune regulatory potentials. This study evaluates the hematinic potentials of polyphenols isolated from *Spondias mombin* Linn. stembark (SMSB) in malaria-induced anaemia. Isolation from the ethylacetate fraction of SMSB was by chromatography, while identification was by 1D, 2D NMR and mass spectroscopy. Malarial was induced in MRI mice by inoculation with *Plasmodium berghei* NK65-strain. Blood components like haemoglobin (HGB), red blood cell (RBC), hematocrit (HCT), white blood cell (WBC), platelet (PLT), mean cell volume (MCV), mean cell haemoglobin (MCH) and mean cell haemoglobin concentration (MCHC) were evaluated using standard procedures. Three of the compounds isolated; gallic acid (**1**) (+)-catechin (**2**), (+)-epicatechin (**3**), were tested. There were significant ($p < 0.05$) reductions in the values of HGB, RBC, HCT, and non-significant ($p > 0.05$) reductions in values of PLT and MCHC in infected mice. Also, the values of MCV and MCH increased upon inoculation, however, those for WBC increased significantly ($p > 0.05$). But, treatment with compounds 1, 2 and 3 led to a dose-dependent improvement in blood parameters with increased concentrations recorded for HGB, RBC, HCT, PLT and MCHC, while WBC, MCV and MCH were reduced to values comparable to those obtained for naive mice. Compound 2 was the most effective, while compound 3 recorded the least activity. Modulation of haematological parameters in favour of recovery by polyphenols from *Spondias mombin* Linn. suggests that the plant could function as natural remedy for the management of anemic conditions.

Keywords: Malaria, Anaemia, Blood components, Isolation, Chromatography

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Serum Lipid Profiles of Albino Rats Fed With Differently Processed *Nigella Sativa*-Based Diets.

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ABSTRACT

This study was conducted to evaluate the serum lipid profile of albino rats fed with differently processed *N. sativa*-based diets. Thirty male albino rats (*Ratus norvegicus*) randomly divided into five groups of six each and kept in the separate cages were used for the study. The treatment groups were given rat chow pellets containing raw (RAW), parboiled (PAN), boiled (BON) and roasted (RON) *N. sativa* dose at 10% supplementation while the control group

(NOD) was fed with rat chow pellet without supplementation with *N. sativa*. The rats were sacrificed, at the end of 35 days, to collect blood samples for serum lidips evaluation. The plasma levels of Total cholesterol (TC), Triglycerides (TG), High-density lipoprotein (HDL) and Low-density lipoprotein (LDL) were determined. The results showed that RAN gave the highest value (in mg/dl) for TC (56.08±1.72) while BON gave the lowest value (45±1.90). The highest value for TG (72.66±5.32) by RAN and the lowest value by PAN. RAN gave the highest value (28.15±0.83) for HDL and the lowest value by BON (22.83±2.34); for LDL, PAN gave the highest value (13.6±0.94) and the lowest by BON (10.03±0. 90). Decrease in HDL and a concomitant increase in LDL and serum cholesterol is indicative of hyperlipaemia, a risk factor of cardiovascular diseases. The increase in total cholesterol observed in the rats fed RAN, PAN, RON-formulated diets above NOD, decrease in the HDL observed in PAN, BON and RON, and increase in the levels of LDL in PAN, RAN and RON, though not too significant, may predispose animals to arthrosclerosis and other related diseases. The results, however, showed that the *N. sativa* seeds processed in any of the methods used in this study is safe for consumption as far as lipid profile is concerned.

Keywords**:** *Nigella sativa*, albino rats, lipid profile, artherosclerosis, cardiovascular diseases

NSBMB/UPH/MB/172

Antimicrobial Potential Of *Littorina Littorea* Shell Chitosan And Its Metallic Nanocomposites

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ABSTRACT

The emergence of nanotechnology has gained significant attention and increasing research on nano-size materials which led to its application(s) in the fields of medicine and agriculture among others. Chitosan (CS) is a cationic polysaccharide obtained from the deacetylation of chitin. Chitin was obtained from the shells of littorea shells and deacetylated to chitosan. Chitosan was used with silver (Ag), copper (Cu), magnetic (Fe), and zinc (Zn) nanoparticles (NP) for the synthesis of nano-composites for evaluation of their antimicrobial properties. Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), and X-ray diffraction (XRD) were carried out. Interestingly, the susceptibility test showed that ZnONP/CS was the most potent antimicrobial agent against *P. fluorescence*, *P. aeruginosa*, *S. aureus*, *B.subtilis*, and *E.coli*. Hence the study showed that chitosan-metal nanoparticles improved antimicrobial properties. Therefore, chitosan from *Littorina littorea* waste material proved cost-effective and a good source of nanomaterials for biomedical applications.

Keywords: Chitosan, nanoparticles, characterization, antimicrobial

NSBMB/UPH/MB/173

A Comparative Study Of The Effects Of Aqueous Extracts Of *Tamarindus Indica* Fruit Pulp And *Zingiber officinale* Rhizomes On CCL_4 –Induced Oxidative Stress In Rats

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ABSTRACT

Tamarind tree is a multipurpose tree of which almost every part finds at least some use, either nutritional or medicinal. Due to its pleasant acidic taste and rich aroma, the pulp is widely used for domestic and industrial purpose. Ginger is known to ease oxidative stress due to stimulation of superoxide dismutase, catalase, glutathione peroxidase and reduced glutathione activities. They are believed to protect against cancer, artherosclerosis, heart diseases and several other diseases. A comparative study was carried out to evaluate the effect of Tamarind and Ginger extracts intake in CCl_4 induced oxidative stress wistar albino rats. The Proximate, antinutrient, and phytochemical of both ginger and tamarind extracts were analyzed using standard AOAC methods while mineral contents were determined using atomic absorption spectrometry. Oxidative stress markers were also analyzed using colorimetric assay kit. Serum oxidative stress markers were compared between the normal and test groups. Experimental rats were divided into seven groups: Normal control group, negative control (CCl_4) group, standard drug (Vitamin C) group, tamarind low and high dose group, ginger low and high dose group. At the end of the experiment, significant increase in malondialdehyde level (18.52 ±1.69) and decrease in superoxide dismutase (2.77±0.69), catalase (3.840±4.36), reduced glutathione (14.06±3.03) and glutathione peroxidase (8.95±5.23) activities were recorded in CCl_4 exposed rats as compared to control group which had (10.57±4.36), (11.96±1.62), (12.20±4.23), (34.86±9.19) and (36.23±7.07) respectively. In the tamarind and ginger supplemented groups, the level of MDA along with the activities of SOD, CAT, GSH and GPx were comparable with the apparently healthy control rats ($p>0.05$). Thus, it appears that ginger and tamarind extracts ameliorate the effect of CCl_4-induced oxidative stress; suggesting that consumption of natural compounds with an antioxidant profile may be a preventive measure to those diseases associated with oxidative stress.

NSBMB/UPH/MB/174

Glycation and Nanomaterials: Unveiling the Role of Nanoparticles in Mitigating the Effects of AGEs and Hyperglycemia

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ABSTRACT

Advanced Glycation End-products (AGEs) result from essential cellular reactions gone awry, becoming 'aging toxins' when glucose surpasses its beneficial threshold. This narrative explores the complex interplay among excess glucose, glycation reactions, and the generation of AGEs,

emphasizing hyperglycaemia's role as a precursor to cellular toxicity, often associated with conditions such as dysfunctional beta cells and subsequent insulin insensitivity in diabetes. The review explores nanoparticles, ultra-small materials with distinctive physical and chemical properties. Despite lingering toxicity concerns, recent advances in nanoparticle design have expanded their use in biology and medicine. The focus is on green nanoparticles with potent antiglycation effects, particularly Gold nanoparticles (AuNPs) demonstrating a significant 55% inhibition of AGEs in collagen-glucoaldehyde mixtures, alongside Silver (AgNPs) and zinc oxide nanoparticles (ZnO NPs). Thus, this review highlights the emerging applications of nanoparticles in AGE modulation, glucose toxicity mitigation, and hyperglycaemia counteraction. Moreover, it offers insights into the latest developments in the intersection of nanotechnology and toxicology, showcasing the transformative potential of these once-feared materials in advancing medical research and therapy.

Keywords: Nanotechnology, toxicity, Nanoparticle design, diabetes, aging, insulin resistance

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Effect And Mechanism Of Codeine Addiction In The Higher Centres Of The Human Brain

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ABSTRACT

This review is aimed at presenting a review on the action and effects of codeine abuse and addiction on the brain. Electronic and printed literature databases like Scopus, PubMed and Google Scholar were searched and reviewed for relevant records using appropriate keywords. Codeine typically lasts four to six hours and takes less than 30 minutes to take effect. It acts as a central nervous system (CNS) depressant and changes the way the body/brain responds to pain. The conversion to morphine causes depressed breathing, resulting in accidental deaths. The more immediate neurological effects of codeine abuse include nausea, dizziness, drowsiness, blood pressure drops and blurry vision. Avoiding withdrawal is a reason for maintaining opioid dependence and potentially opioid addiction. Codeine abuse increases feelings of relaxation and euphoria and cause a rush of dopamine in the brain. All these factors play a role in developing an addiction.

Keywords: Drugs; Brain; Codeine, Neurons; Addiction; Synapse; Neurotoxicity

NSBMB/UPH/MB/176

Resulting Anti-Oxidant, Anti-Inflammatory And Anticholinesterase Effect Of *Tithonia diversifolia* In Male Wistar Rats Induced With Inflammation

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ABSTRACT

Inflammation is the immune system's reaction to damaging stimuli like pathogens, damaged cells, poisonous substances, or radiation. It functions by eradicating harmful stimuli and start the healing process. *Tithonia diversifolia* is a species of flowering plant in the *Asteraceae* family known for its medicinal properties in treatment of diabetes, diarrhea, menstrual pain, malaria, hematomas, hepatitis, and hepatomas. This study was carried out to assess the antioxidant, anti-inflammatory and anticholinesterase properties of *Tithonia diversifolia* aqueous extract on the brain of male Wistar rats induced with inflammation. The anti-oxidant activity of *T. diversifolia* was assessed through FRAP, ABTS radical scavenging, GSH concentration, GPx activity and Nitric oxide radical scavenging assays. Anti-inflammatory activity was also carried out through IL-6, TNF-α and VCAM activity assays and anticholinesterase (ACHE) was also assessed. Histopathological assessment of the brain structure was carried out using H and E staining method. There was increase FRAP activity of the extract and also the level of ABTS and NO scavenging ability was increased at $p < 0.05$ when 250 mg/kg bwt and 500 mg/kg bwt was administered. The concentration of GSH increased while the activity of GPx increased significantly at $p < 0.05$. The results of IL-6, TNF-α and VCAM showed that the extract enhances the anti-inflammatory system of the experimental rats. Therefore, this study suggested that, *T. diversifolia* leaf extract exhibited antioxidant, antiinflammation and anti-cholinesterase activities.

Keywords: *Tithonia diversifolia*, Anti-oxidant, Anti-inflammation, Anticholinesterase, inflammation.

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Flavonoid-Rich Fraction of *Monodora Tenuifolia* Benth Seeds Improves Antioxidant Status In Male Wistar Rats With Streptozotocin-Induced Diabetes Mellitus.

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ABSTRACT

This study investigated the modulatory effect of a flavonoid-rich fraction of *Monodora tenuifolia* seed (FRFMTS) on oxidative stress and antioxidant enzymes in diabetic Wistar rats. The plant seeds were collected, and identified then, hydro-ethanolic extract was obtained with 80% (v/v) ethanol and partitioned with solvents to obtain the FRFMTS. Diabetes mellitus was induced with a single dose of 40 mg/kg bwt streptozotocin and the rats were treated according to their grouping; group 1: non-diabetic control, groups 2 and 3: non-diabetic treated with 25 mg/kg FRFMTS and 50 mg/kg FRFMTS, respectively. Group 4: diabetic control group, groups 5 and 6: diabetic groups treated with 25 mg/kg and 50 mg/kg FRFMTS, respectively, while group 7: diabetic treated with 6.67 mg/kg metformin. Antioxidant status, oxidative stress biomarkers and activities of antioxidant enzymes were determined in plasma, heart, and kidney tissues using established procedures. Plasma total antioxidant status was increased significantly ($p<0.05$) in diabetic rats upon treatment with 25 mg/kg FRFMTS and 50 mg/kg FRFMTS. The activities of glutathione peroxidase (GPx), catalase (CAT) and superoxide dismutase (SOD) in the plasma, heart, and kidney of diabetic rats significantly decreased while lipid peroxidation (LPO) was elevated when compared with normal control groups. Administration of 50 mg/kg bwt FRFMTS significantly increased the activities these enzymes in the diabetic rats when compared with diabetic control groups. The treatment of diabetic rats with 25 mg/kg FRFMTS and 50 mg/kg FRFMTS improved SOD and CAT activities in the heart and kidney while both concentrations significantly reduced LPO in the plasma and heart. The results showed that FRFMTS reduces oxidative stress and enhances the activities of antioxidant enzymes in STZ-diabetic Wistar rats. As such, FRFMTS could be useful in the management of diabetic complications arising from oxidative damage.

Keywords: Oxidative stress, antioxidants, *Monodora tenuifolia*, diabetes mellitus, hyperglycemia

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Sulfasalazine-Induced Genotoxic And Apoptotic Effects In Bone Marrow And Semen. Comparative Protective Effects Of Quercetin And Rutin

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ABSTRACT

Sulfasalazine, an anti-inflammatory drug used in the treatment of inflammatory bowel diseases poses a threat to male reproductive potential. With a growing interest in the protective ability of dietary flavonoids against drug-induced male reproductive toxicities, we investigated the protective and or ameliorative potentials of quercetin and its glycoside derivative – rutin in sulfasalazine-induced genotoxicity in the bone marrow and apoptosis in testis and epididymis of male Wistar rats. Thirty rats were divided into six groups (n=5) and orally administered the following for 14 consecutive days: Group 1: 0.5% sodium carboxymethyl cellulose (1ml/kg). Group 2: quercetin (20mg/kg). Group 3: rutin (10mg/kg). Group 4: sulfasalazine (600mg/kg). Group 5: sulfasalazine (600mg/kg) + quercetin (20mg/kg). Group 6: sulfasalazine (600mg/kg) + rutin (10mg/kg). Sulfasalazine increased the frequency of micronuclei in bone marrow of

treated rats, evident of its genotoxic potential. Quercetin and rutin decreased this frequency. Sulfasalazine increased p53, caspase 9 and 3 above control levels in semen. These were significantly decreased in sulfasalazine-treated rats co-exposed to quercetin than rutin. TUNEL positive sperm increased in epididymis of sulfasalazine-exposed rats indicative of apoptotic cell death of sperm cells. These were decreased in epididymis of rats when sulfasalazine was administered with quercetin or rutin. However, levels of p53, caspase 9 and 3 as well as TUNEL-stained sperm cells were not elevated in the testis.Sulfasalazine induced apoptosis in epididymis but not testis, and genotoxicity in bone marrow of treated rats. This was significantly ameliorated on co-administration of sulfasalazine with quercetin than with rutin.

Keywords: Sulfasalazine, Quercetin, Rutin, Apoptosis, Semen

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Iron Deficiency Anaemia in Pregnant Women in Nigeria: Current State, Challenges, and Possible Solutions.

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ABSTRACT

Iron deficiency anaemia (IDA) remains a critical public health issue globally, particularly affecting pregnant women in low-resource settings like Nigeria. Despite efforts to combat this condition through iron supplementation programs, IDA persists due to various factors including limited access to healthcare, poor adherence to supplementation, inadequate nutrition education, and socioeconomic disparities, posing significant risks to maternal and fetal health. This article provides an overview of the current state of IDA in pregnant women in Nigeria, evaluates the effectiveness of iron supplementation, discusses existing challenges, and proposes potential solutions to address this pressing issue.

Keywords: iron deficiency anaemia, prevalence, risk factors, iron supplementation

NSBMB/UPH/MB/180

Effect Of Aqueous Leaf Extract Of *Euphorbia Hirta* On Carbon Tetrachloride-Induced Liver Damage In Albino Rats

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ABSTRACT

Liver disease has become one of the major causes of morbidity and mortality in man and animals all over the globe arising from toxins, infectious and non-infectious conditions. This research was aimed at studying the effect of aqueous leaf extract of Euphorbia hirta on carbon

tetrachloride- induced liver damage in albino rats. Thirty-six rats were divided in to five groups based on the treatment they received., Acute oral toxicity test of the aqueous leaf extract of Euphorbia hirta was carried out using OECD Method. Also, qualitative and quantitative phytochemical analysis of the extract was carried out. Results of the acute toxicity test showed that the aqueous leaf extract of Euphorbia hirta was not toxic as there were no deaths at 5000 mg/kg. The phytochemical analysis showed alkaloids, glycoside, tannin, phenol and steroid were present with the concentration of glycoside being highest. Induction of liver damage significantly ($P<0.05$) increased serum AST, ALT, ALP and serum total bilirubin while administration of the standard drug and different doses of E. hirta to rats significantly ($p< 0.05$) restored the altered biochemical indices to normal. In conclusion, the overall results showed that aqueous leaf extract of Euphorbia hirta has phytochemical components that can be used in treating liver damage.

Keywords: Euphorbia hirta, carbon tetrachloride, hepato toxicity, aqeous leaf extract

NSBMB/UPH/MB/181

The human PDX1 gene: A prospective target for the treatment of type-2 diabetes mellitus through downregulation of oxidative stress

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ABSTRACT

Diabetes mellitus, a non-communicable disease, along with cardiovascular diseases, cancers, and chronic respiratory diseases, account for 74% of all deaths globally. The continuous rise in the cases of diabetes mellitus worldwide is alarming, with yet no known cure. The disease is a major metabolic disorder characterised by hyperglycemia. Much effort had been invested in the transient management of diabetes, but little success had been made to eradicate the persistent complications. Type-2 diabetes mellitus (T2DM) makes up around 90% of the cases of diabetes among people aged 20 to 79 worldwide, which increased by 16% between 2019 and 2021. An estimated 46% global increase is expected by 2045; hence, the need for a reliable and effective treatment persists. This type of diabetes (T2DM) is a non-insulin-dependent condition brought on by aberrant insulin production or insulin resistance in insulin-responsive tissues. Insulin is produced in the pancreatic β-cells and regulated by the pancreatic and duodenal homeobox 1 (PDX1) genes. Oxidative stress, a major factor in PDX1 gene downregulation influenced by glucotoxicity and lipotoxicity, is associated with T2DM. Therefore, this study highlights strategies that target the PDX1 gene via down-regulation of oxidative stress in the quest to find a cure for T2DM.

Keywords: Type 2 diabetes, β-cell, Diabetes treatment, Oxidative stress, PDX1 gene

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AN EVALUATION OF TOXICITY POTENTIAL OF *Micromeria Imbricata* IN ALBINO RATS

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ABSTRACT

Micromeria imbricata is a widely used herbal plants among people of tropical and sub-tropical regions of the world. It has been documented in literatures that extract of *M. imbricata* leaves has; antimicrobial, larvicidal, antioxidant, antianxiety and antidepressant activity etc. Studies have proved the association of active pharmacological ingredients of some herbal remedies and their metabolites with adverse effects that might range from mild allergic reactions to death. Despite available data on activities of *M. imbricata* there are no information relating to its toxicity and safety hence, the present study. Leaves of *M. imbricata* were collected and identified at the Nigeria Montane Forest Reserve Ngel-Nyaki, Yelwa Sardauna Local Government Area of Taraba State (Voucher number: NMFP/0123/0018). The shade-dried leaf was extracted using 70% methanol and the extract recovered by rotary evaporation. Median Lethal dose (LD_{50}) was determined using the Lorke's method and was estimated to be 2154mg/kg. Three treatment group were administered which are 26.90mg/kg, 53.85mg/kg and 107.00mg/kg respectively at the end of two weeks experiment the liver enzymes AST, ALP and ALT were found to be significantly elevated above (90.5±7.50U/L, 150.00±80.25U/L, and 349 ±13.85U/L respectively). The total bilirubin was significantly elevated from 11.7 ±2.02 mg/dL in the control group to 45.03±9.1170, 54.4±1.38 and 43.9±12.00 mg/dL. The direct bilirubin on the other hand was elevated from 7.25±2.62in the control to 22.03±6.90, 23.05±5.05 and 18.46±3.84 mg/dL. The total protein in the other hand, from 11.7±2.02 mg/dL to 45.03±9.11, 54.4±1.38 and 43.9±12.00 mg/dL respectively which was considered significantly higher at $P < 0.05$.

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Hepatoprotective Potentials of Ethanol Extracts from Seeds and Pulps of *Artocarpus. Heterophyllus*

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ABSTRACT

The hepatoprotective potentials of the seeds and pulp of *Artocarpus heterophyllus* were evaluated in this study. Male albino rats (n=105) weighing 120-160g, were used in this study. They were divided into 21 experimental groups and administered with different test solutions;

Group A, (uninduced, untreated), group B & C (induced, untreated and induced, but treated with standard drugs respectively), groups D to F (induced but treated with 500mgkg^{-1}, 750mgkg^{-1}, 1000mgkg^{-1}, body weight of *A. heterophyllu* ethanol Seed Extract respectively), groups G to I (induced but treated with 500mgkg^{-1}, 750mgkg^{-1}, 1000mgkg^{-1}, body weight of *A. heterophyllu* ethanol pulp Extract respectively), groups J to K (induced but treated with 250mgkg^{-1} , 375mgkg^{-1} , 500mgkg^{-1} body weight of *A. heterophyllus* ethanol seed and pulp Extract), Groups M to U were used for preventive potentials' study with 2000mg/kg of acetaminophen co administered with seed and pulp extracts as seen in groups D to K respectively for 28 days. The liver function was evaluated. Results obtained after induction of hepatotoxicity, shows significantly damaged liver as values range for AST (12.00 to 23.00), ALT (10.00 to 21.00) ALP (150.00 to 190.00), Total Protein (54.00 to 62) and Total Bilirubin (10.00 to 13 .00). significant improvement was seen after two weeks of Treatment as results range for AST (12±1.16 to 33±0.29), ALT (12±0.58 to 30±0.11) ALP (127±1.15 to 250±0.10), Total Protein (77±0.36 to 58±0.38) and Total Bilirubin (7±1.15 to 15±0.26), while by week 4 obtained values showed totally restored liver. Values obtained for the treatment groups were significantly different from control groups B and C and non-significantly different from group A at $p<0.05$. The study revealed that the ethanol extracts of the seed and pulp of *A. heterophyllus* have ameliorative effects on Acetaminophen induced liver toxicity in Wistar rats at 375mg/kg.

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Phytochemicals Screening And *In-Vivo* Anti-Diabetic Potentials Of *Citrus Sinensis* L. Peel Methanol Extract In Albino Rats

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ABSTRACT

Oxidative stress resulting from high levels of reactive oxygen species (ROS) significantly contributes to diabetes and its complications. This study was aimed at evaluating the phytochemical composition and *in-vivo* anti-diabetic effects of *Citrus sinensis* (L.) peel methanol extract in albino rats. Phytochemical analysis of *C. sinensis* peel extract revealed the presence of flavonoids, tannins, alkaloids, saponins, glycosides, volatile oils and steroids. Acute toxicity tests showed the extract's safety at 5000 mg/kg body weight. In the *in-vivo* experiment, 18 rats were divided into six groups, with alloxan-induced diabetes in all but group 1. Groups 1, 2, and 3 served as normal, negative, and positive controls, receiving distilled water, alloxan, and glibenclamide, respectively. Groups 4, 5, and 6 were administered the extract at 100mg/kg, 200mg/kg, and 400mg/kg. Mean weekly body weights were significantly lower in the untreated (negative) control group than those of the extract and glibenclamide treated groups. Fasting blood glucose levels significantly ($p < 0.05$) increased in the negative control group compared to the normal control at the beginning (week 0). However, after one week of treatment (week 1), a significant ($p < 0.05$) reduction in blood glucose was observed in all extract and standard drug-treated groups compared to the negative control. This reduction persisted at weeks 2 and 3. This study concludes that *C. sinensis* peel methanol extract possesses anti-diabetic potential by positively influencing body weight and consistently

reducing blood glucose levels in diabetic-induced albino rats. These findings suggest a promising avenue for utilizing *C. sinensis* waste to promote health.

Keywords: Ant-diabetic, *Citrus sinensis*, Alloxan, Oxidative stress, Albino Rats

NSBMB/UPH/MB/185

Dietary calabash chalk induced declined reproductive fitness in Harwich strain *Drosophila melanogaster*

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ABSTRACT

Calabash chalk is a naturally occurring mineral, its consumption became widespread in Nigeria among pregnant women for remedy of morning sickness. Despite increased consumption, there is no scientific prove to justify this claim. The study aimed at finding the effects of dietary consumption of calabash chalk (CCH) on the fecundity, filial output in *Drosophila melanogaster* (Harwich strain). The similarities in basic physiological mechanisms between humans and *Drosophila* makes the fruit fly a promising model for the study. The study was performed using standard methods. The LC50 of the CCH was determined as 1800mg/kg of 10g of Standard corn meal diet. The study was performed in five groups with control;group 1 control fed on 10g diet, group 2,3,4,5 fed on 225mg,450mg,900mg and 1800mg of CCH in 10g standard corn meal diet respectively for 30days respectively. The results indicates a statistical decrease ($p < 0.05$) in fecundity (egg laid) and filial output (filial eclosion) in the 900mg and 1800 mg CCH diet fed flies compared to the control. In conclusion: CCH consumption causes a decrease in reproductive fitness (fecundity) and filial output in *D. melanogaster* (Harwich strain) this finding justifies the deleterious effect of CCH on reproductive and eclosion in the physiology of the fruit fly.

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Effect Of *Lycopersicon esculentum* AND *Daucus carota* On Physical And Haematological Characteristics Of Wistar Rats Exposed To Breast Cancer Causing Dimethylbenz-[A]-Anthracene (DMBA)

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ABSTRACT

Breast cancer refers to an uninhibited growth and proliferation of cells initiating from breast tissue that is usually from the inner lining of milk ducts or the lobules which provide the ducts with milk due mutations in the genes responsible for regulating the growth of cells and keeping them healthy. Significant depletion of resources and exposure to risk as a result of diagnosis and or treatment of breast cancer could be prevented with neutraceuticals. This research aimed at exploring the potentials of tomato and carrot-supplemented diets in mitigating cancer-causing agents (dimethylbenz-[a]-anthracene) in animal models. Forty-eight female rats were randomly distributed into 8 groups. Group 1: normal rats fed standard rat chow. Group 2; DMBA administered group fed standard rat chow. Group 3-5: DMBA administered fed 20% (tomato, carrot, and mixed tomato/carrot-supplemented diets), Group 6-8 normal rats fed 20% (tomato, carrot and mixed tomato/carrot-supplemented diets) respectively for the period of 10 weeks. Standard methods were utilized for the analyses. The result of the proximate composition indicated significant difference in all the formulated diets compared to the control diet. The result indicates significantly ($p<0.05$) higher feed intake in all the groups fed supplemented diets compared with the control. Groups fed carrot and tomato had significantly higher percentage increase in body weight compared with the control, while there was lower percentage weight gain in the groups fed mixed carrot and tomato. There was decrease in WBC and PLT concentrations in the treated groups and increase in RBC and HGB in treated groups compared to the DMBA-induced cancer group. Tomato and carrot have protective effect against DMBA-induced toxicity and their supplementation could prevent breast cancer.

Key words: Body Weight, Breast Cancer, Dimethylbenz-[a]-anthracene, Feed Intake, Hematopoiesis.

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Anti-Asthmatic Activities Of Ethanol Crude Extract Leaves Of Adansonia Digitata Using Guinea Pig Model of Asthma.

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ABSTRACT

This study investigated the anti-inflammatory effect of ethanol crude extract of *A. Digitata* leaves on the airways in chronic asthma. Ovalbumin (OVA) induced asthma was used to assess the activities of ethanol crude extracts of *A. Digitata* on airway reactivity, lung inflammation, and oxidative stress markers in Guinea pigs. The G. pigs were sensitized and challenged with OVA to produce a G. pig model of asthma. Guinea pigs were classified into three (03) groups of five (05) animals each control, asthmatic, or asthmatic receiving 200 mg·kg–1bw·day–1 orally. The time (min) for pre-convulsive dyspnea, after sensitization with OVA and induction of bronchospasm with 2% OVA in normal, asthmatics and 200 mg/kgbw A. Digitata treated Dunkin Hartley guinea pigs, were recorded. At the end of the experiment, the anti-inflammatory and antioxidative activities of A. Digitata ethanol crude extracts were assessed. The crude ethanol extract of A. Digitata in cumulative concentrations (0.01–10 mg/mL), were tested on contractions of isolated G. pig tracheal preparations. Furthermore, concentration

response curves (CRCs) of histamine and carbachol were constructed in the absence and presence of the extract. Standard organ bath methods were used. The asthmatic group exhibited a significant increase in, airway hyperreactivity to OVA aerosol, significant increase total and differential leucocyte count in the bronchoalveolar lavage fluid (BALF) and lung lipid peroxidation and a significant decrease in superoxide dismutase and glutathione peroxidase compared to the control group. Treatment with ethanol crude extract of *A. Digitata* leaves prolonged the onset of pre-convulsive dyspnea by 76.1% ($p< 0.01$), enhancing percentage protection against OVA-induced bronchospasm by 67.4-fold. It attenuated the extensive trafficking of inflammatory cells into the BALF and inhibited their infiltration around the respiratory tracts and vessels. Ethanol crude extracts of *A. Digitata* (200 mg/ Kgbw) significantly inhibited (60.4 ± 8.3%) contractile responses of histamine and produced significant inhibition (56–79%: $p < 0.05$).

Keywords; Ovalbumin, bronchoalveolar lavage fluid, Dyspnea, Bronchospasm

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Association of Oral Contraceptives consumption with C-reactive protein (CRP), tumor necrosis factor-α (TNF-α) and Interleukin (IL-6) in female *in vivo* model

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ABSTRACT

The aim of the study was to determine the effects of oral contraceptive pills (Exluton and combi) on these inflammatory biomarkers. Twenty-five adult female albino wistar rats were obtained from the Animal house of Rivers State University, Port Harcourt and were divided into 5 groups of five wistar rats each- Control, 200mg/kg exluton, 400mg/kg Exluton, 200mg/kg Combi-3, and 400mg/kg Combi-3 groups. They were allowed standard feed and water *ad libitum* to acclimatize for 14 days, after which the test drugs were administered to the various groups for 21 days. The rats were sacrificed, blood samples were collected for assessment of CRP, TNF and IL-6 using standard laboratory procedures. Data obtained were subjected to IBM SPSS, version 25 for statistical analysis. The results for CRP revealed a non-significant ($p\leq0.05$) decrease in the groups 200mg/kg Exluton, 400mg/kg exluton, and 200mg/kg Combi-3 and a nonsignificant ($p\leq0.05$) elevation of 400mg/kg combi3 group. The result for IL6 demonstrated a significant ($p\leq0.05$) elevation and reduction in 200mg/kg Exluton and 400mg/kg Exluton groups respectively and a non-significant ($p\leq0.05$) increase and decrease in 200mg/kg Combi-3 and 400 mg/kg Combi-3 respectively. The findings for TNF showed that a significant elevation was observed in TNF on administration of Exluton and Combi-3 when all were compared with the control groups. Based on the findings of this study, the oral contraceptives of study tend to inhibit elevation of C- reactive protein, have variable changes on IL6, tending to decrease it at high doses. A markedly significant increased TNF was also observed. This could account for the potential risk in incidences of autoimmune, cardiovascular, neurodegenerative and other metabolic risk associated with oral contraceptives.

Keywords: Oral contraceptives, Exluton, Combination 3, TNF, CRP, IL6.

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Protective Potential Of Aqueous Avocado Seed Extract On Soot-Induced Gonadotoxicity In Male Albino Rats

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ABSTRACT

Avocado seed is often discarded as waste after consumption of the ripe fruit. Exposure to environmental pollutants such as soot can have toxic effects on male fertility potentials. This study investigated the protective potential of aqueous avocado seed extract on soot-induced alteration of serum testosterone and antioxidant levels in male albino rats. Dry avocado seeds were ground into powder and aqueous extract obtained by cold maceration. Phytochemical composition of the extract was analyzed using standard colorimetric method. Twenty male albino rats weighing 100 – 140g were randomly selected and divided into four groups with five rats in each group namely; G1 (Control), G2 (34.78mg/kg bwt soot suspension), G3 (34.78mg/kg bwt soot suspension + low dose extract) and G4 (34.78mg/kg bwt soot suspension + high dose extract). Treatment was via oral gavage daily for 14 days, after which the rats were sacrificed and blood collected for analysis of serum Total Protein (TP), Albumin, Testosterone and Oxidative Stress Biomarker using standard methods. The results revealed that the aqueous seed extract contained Flavonoids (8.00±0.0101mg/ml), Phenols (1.96±0.01mg/ml), Tannins (38.10±0.01mg/ml), Cardiac Glycoside (0.55±0.01mg/ml) and Carotenoids (9.07±0.01mg/ml). Exposure to soot at 34.78mg/kg bwt significantly ($p<0.05$) decreased the levels of testosterone, glutathione (GSH) and glutathione peroxidase (GPx) in the treated rats compared to Control while co-administration of the soot and aqueous extract significantly ($p<0.05$) increased testosterone, GSH and GPx levels, in a dose related manner, compared to soot control. Also, exposure to soot significantly ($p<0.05$) increased TP, Albumin and Malonaldehyde levels, while co-administration of the avocado seed extract and soot significantly ($p<0.05$) reduced these levels in a dose related manner. These results suggest that aqueous avocado seed extract have potential as therapeutic agent for preventing soot-induced alterations in serum testosterone and oxidative stress biomarkers.

Keywords: Soot, Avocado seed, testosterone, Oxidative stress, Phytochemicals

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Effect Of Chloroform Fraction Of Gongronema Latifolium On Aloxan-Induced Rats

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ABSTRACT

Diabetes mellitus is a metabolic disorder with characterized by raised blood glucose as the most common feature. The effect of chloroform fraction of gongronema latifolim on body weight, blood glucose level and lipid profile was evaluated in alloxan-induced diabetic wistar rats using standard methods. The result revealed that the admnistration of alloxan monohydrate increases glucose (248mg/dl), serum total cholesterol (TC) (9.92 mmol/l), triglycerides (TG) (3.18 mmol/l), low density lipoprotein cholesterol (LDL) (1.1 mmol/l) levels as well as

decrease high density lipoprotein cholesterol (HDL) (1.08 mmol/l) and body weight. However, treament with chloroform fraction ((200mg/kg=150gb.w, 170mg/dl;4.52mmol/l TC; 2.64mmol/l TG; 1.50 mmol/l HDL; 1.02mmol/l LDL; 0.70 mmol/l VLDL)(400mg/kg=175gb.w,146mg/dl; 4.03 mmol/l TC; 2.47 mmol/l TG; 1.60 mmol/l HDL; 0.92 mmol/l LDL; 0.58 mmol/l VLDL)) and glibencamide (182gb.w, 127mgdl; 3.01 mmol/l TC, 2.31 mmol/l TG; 1.72 mmol/l HDL; 0.83 mmol/l LDL; 0.46 mmol/l VLDL) significantly($p<0.05$) reduced the dyslipidaemic changes caused by alloxan treatment in all assayed parameters. This study shows that chloroform fraction of Gongronema latifolium exerted a hypoglycaemic effect and improved the lipid profile in diabetic rats.

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Biochemical, Histomorphometry and Immunohistochemistry Studies Of *Syzygium Aromaticum* In Monosodium Glutamate (MSG) Induced-Endometrial Hyperplasia Rats

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ABSTRACT

Endometrial hyperplasia is characterized by abnormal proliferation of the uterine endometrial cells that results in the thickening of the endometrium. These proliferative changes lead to the remodelling and heterogeneous distributions of endometrial glands (Wang *et al.,* 2022). Endometrial hyperplasia is clinically divided into simple hyperplasia without atypia, simple hyperplasia with atypia, complex hyperplasia without atypia and complex hyperplasia with atypia (WHO, 2014). The study aimed to investigate the effects of *S. aromaticum* extract (SAE) on biochemical, histomorphometry and immunohistochemistry studies in MSG-induced endometrial hyperplasia rats. Thirty (30) rats were divided into six groups: Normal, Negative (MSG induced + 2% DMSO), Positive (MSG + 0.6 mg/kg letrozole), and three treatment groups (150 mg/kg, 300 mg/kg, and 450 mg/kg of SAE; 8 hr after MSG induction). Treatments were via oral route for 60 days. SAE caused significant elevations ($p < 0.05$) in the serum hormonal, liver, lipid, kidney and oxidative stress indices of MSG induced endometrial hyperplasia rats in comparison to all controls. Its histomorphometry analysis had significant differences ($p < 0.05$) to the Negative control while its morphology had sparse inflammatory cellular infiltrates and heterogeneous glandular epithelium. IHC analysis showed great significant differences in its H-score.MSG increased most biochemical indices and caused ovarian cysts and uterine hyperplasia; characterized by increased fibroblast cell density, and structural changes in the endometrial stroma while SAE significantly reversed most of these effects in a dose-dependent manner.

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In vitro Anti-inflammatory Activities of Methanol leaf extracts of *Musanga cercropioides* and *Maesobotrya barteri*

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ABSTRACTS

Medicinal plants have been exploited for the treatment of inflammatory related diseases since time immemorial. This is because they are readily available, affordable and confers little or no side effects as compared to the synthetic drugs that have shown numerous physiological complications. The aim of this study was to assess the *in vitro* anti-inflammatory properties of the methanol leaf extracts of *Musanga cercropioides* and *Maesobotrya barteri.* Human erythrocyte membrane stabilization, albumin protein denaturation and anti-proteinase assays were employed to assess the *in vitro* anti-inflammatory potential of the plants' extracts. Results showed that *M. cercropioides* extracts had a higher inhibition of protein denaturation and also a significantly higher ($p < 0.05$) ability to protect the human red blood cell (HRBC) membrane against haemolysis induced by heat and hypotonicity than *M. barteri.* However, *M. barteri* exhibited a higher inhibition of protein denaturation when compared to *M. cercropioides* ($p < 0.05$) at 600 µg/ml of extracts. The overall findings from this study suggests that *M. cercropioides* and *M. barteri* leaf may be useful in the management of inflammatory conditions resulting from oxidative stress related etiology.

Keywords: Anti-inflammation, Diclofenac sodium, Human erythrocyte membrane, *Maesobotrya barteri, Musanga cercropioides,* Proteinase, Protein denaturation.

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Antidiabetic effect of aqueous, methanolic and petroleum ether extract of ripe *Carica papaya* seed in Streptozotocin (STZ)-induced diabetic albino rats

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ABSTRACT

Antidiabetic effect of aqueous, methanol and petroleum ether extract of ripe *Carica papaya* L seed in streptozotocin-induced diabetic albino rats were investigated. The rats were randomly assigned to nine experimental groups (n=9). That is 1, 2, 3, 4, 5, 6, 7, 8 and 9. All the animals were exposed to the same food and water throughout the 3 weeks study duration. Group 1 received 0.9% sterile saline, group 2 was induced with diabetes, Group 3 was induced with diabetes and treated with standard drug, Group 4 was induced with diabetes and treated with 200 ml/kg body weight (bw) of PET seed extract of *C. papaya,* group 5 was induced with

diabetes and treated with 200 ml/kg body weight (bw) of MET seed extract of *C. papaya*, group 6 was induced with diabetes and treated with 200 ml/kg body weight (bw) of AQ seed extract of *C. papaya*, group 7 normal saline and 200 ml/kg body weight (bw) of petroleum ether seed extract of *C. papaya*, group 8 normal saline and 200 ml/kg body weight (bw) of methanolic seed extract of *C. papaya*, group 9 normal saline and 200 ml/kg body weight (bw) of aqueous seed extract of *C. papaya*. Results of this experiment showed a significant increase ($P<0.05$) in fasting blood glucose level. There was also a significant increase ($P<0.05$) in malondialdehyde and a significant decrease ($P<0.05$) in oxidative stress markers such as SOD, CAT and GSH. Similarly, there was a significant increase ($P<0.05$) in aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, gamma glutamyl transferase and decreased in body weight of rats. Also, induction of streptozotocin caused a significant increase ($P<0.05$) in total cholesterol, triacylglycerol, very low density lipoprotein cholesterol and low density lipoprotein cholesterol with decreased in high density lipoprotein cholesterol. Interestingly, co-administration of aqueous, methanol and petroleum extract of *Carica papaya* L. seed significantly decreased ($P<0.05$) the level of fasting blood glucose and reversed the abnormal trends observed in the dysregulated biochemical biomarkers.

Key words: *Carica papaya*, diabetes mellitus, biomarkers, fructose and lipoprotein

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Polyphenols Ameliorate Testosterone Propionate-Induced Benign Prostrate Hyperplasia in Rats: focus on Oxidative stress, Inflammation and Spermatic Indices.

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ABSTRACT

This study investigated the effect of polyphenols (kolaviron and quercetin) on oxidative stress, inflammation and spermatic indices of testosterone propionate-induced benign prostatic hyperplasia (BPH) in Wistar rats. Forty-two animals were used for this study and divided into six groups of seven animals each. Group one served as normal control and received 0.5ml Canola oil, whereas groups two to six were experimental BPH groups and received intraperitoneal injection of 5mg/kg body weight testosterone for four weeks. Following BPH induction, group two received 0.5ml Canola oil, while groups three to six were respectively treated with 150mg/kg body weight Kolaviron, 15mg/kg body weight Quercetin, 150mg/kg body weight kolaviron plus 15mg/kg body weight quercetin, and 5mg/70kg body weight finasteride for twenty-eight days. After the treatment period, all animals were sacrificed, blood was collected and used for serum biochemical assays using standard methods. Results obtained showed that BPH induction caused reductions in SOD, CAT, GSH, TAC, and GPx levels, while treatment with Kolaviron, Quercetin and a combination of Kolaviron + Quercetin reversed these decreases. Results also showed increased MDA, MPO, H_2O_2, NO, and GST levels following BPH induction; all of which were reversed by treatment with polyphenols (kolaviron and kolaviron) both singly and in combination. Furthermore, abnormalities in spermatic indices (morphology, agglutination, motility, vitality and testicular circumference) caused by BPH induction were reversed following treatment with the polyphenols. Conclusively, our study demonstrated that polyphenols (kolaviron and quercetin) ameliorate oxidative stress as well as restore normal sperm integrity in experimental BPH.

Keywords: Testosterone propionate, Kolaviron, Quercetin, BPH, Sperm morphology.

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GCMS Profiling Of Hexane-Acetone Fractions Of *Sesamum Indicum* Seed (SIS) And Hepato -Reno Protective Effect Of Crude Extract And Fractions Of SIS On Cyclophosphamide-Intoxicated Rats

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ABSTRACT

The use of *Sesamum indicum* (SIS) seed to manage liver and kidney toxicity by African herbal healers lacks scientific validation. Herein, we evaluated the Gas chromatography mass spectroscopy (GCMS) investigation of n-hexane-acetone fraction of SIS and ameliorative effect of crude extract and fractions of SIS on some renal and hepato toxicity indices in cyclophosphamide-intoxicated male rats. GCMS analysis revealed cis-13-octadecenoic acid, methyl ester, hexadecanoic acid methyl ester, n-hexadecanoic acid, cis-vaccenic acid and oleic acid as the bioactive compounds with highest percentages. Forty-eight albino rats were randomly assigned to seven groups and given different treatment for 28 days. When compared with the untreated group, groups treated with SIS extract and fractions significantly ($p<0.05$) decreased the activities of alkaline phosphatase (ALP), aspartate transaminase (AST) and alanine transaminase (ALT) except 200 and 400mg/kg bodyweight (b.w) of the hexane extract which did not show any significant difference in ALP activity compared to the untreated group. Group treated with methanol fraction significantly ($p<0.05$ improved the total protein and albumin concentration when compared with the untreated group. Total and conjugated bilirubin concentrations were significantly ($p<0.05$) reduced by the 100mg/kg b.w of the crude SIS extract and different fractions of SIS when compared with the untreated group. Co-administration of different doses of extracts and methanol fraction of SIS and CYP significantly ($p < 0.05$) reduced the urea and creatinine concentrations. A reversal of the distorted histomorphology of the liver and kidney caused by CYP intoxication was observed in animal administered SIS extract and fractions. It could be that the bioactive compounds such as hexadecanoic acid methyl ester and n-hexadecanoic acid and antioxidants such as flavonoids, phenols, vitamin c and lignan present in SIS protected the liver and kidney against free radicals generated by cyclophosphamide.

Keywords: GCMS, Renal toxicity, hepatotoxicity, Cyclophosphamide, *Sesamum indicum* seeds

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Towards Control of Schistosomiasis in Nigeria: Rationale and Implementation Design

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ABSTRACT

Schistosomiasis is a water-based parasitic neglected tropical disease (NTD) that abounds in poverty-stricken communities of the tropics where access to clean water and sanitation are a challenge. It is a chronic immuno-inflammatory disease of public health importance characterized by liver pathology, anaemia, stunting, bladder carcinoma and infertility. Globally, Nigeria has the highest burden of the disease. Although multiple intervention methods exist, in Nigeria school-aged children are the main target in a mass administration of medicine campaign with antischistosomal drug, Praziquantel (PZQ). However, PZQ intervention alone is not effective in controlling the disease owing to its ineffectiveness against migrating schistosomula, in blocking reinfection and in resolving pathology after treatment. With the current World Health Organization's bid to control and eliminate schistosomiasis as a public health problem by 2030, a robust multidimensional intervention approach is needed. This paper therefore discusses schistosomiasis intervention implementation strategies involving snail intermediate hosts, water, sanitation and hygiene (WASH), among others, with a view to reducing disease burden and blocking further transmission, against the backdrop of emerging hybrid schistosomes.

Keywords: Schistosomiasis, behaviour change, Snail intermediate hosts, WASH, implementation interventions

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In Vitro Antitrypanosomal Activity Of Some Medicinal Plants Used In Zuru Local Government Area, Kebbi State, Nigeria

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ABSTRACT

The pursuit of new trypanocidal drugs has received significant attention due to severe side effects associated with existing medications and increasing resistance to known drugs and no new, safe and reliable trypanocides have been introduced for over three decades. In this study, phytochemical analysis and *in vitro* antitrypanosomal screening of methanol extracts of *Rogeria adenophylla, Ricinus communis, Bauhinia rufescens* leaves and *Musa sapientum* flower were carried out using standard methods. Highly parasitized blood from infected donor rats was diluted with glucose phosphate buffered saline solution and incubated with varying

concentrations (5, 10, 15 and 20mg/ml) of the extracts in Eppendorf tubes for 60 minutes. Aliquots from the mixtures were removed and observed under microscope for parasite motility at 10 minutes interval. Qualitative and quantitative phytochemical analysis revealed the presence of alkaloids, saponins, terpenoids, steroids, phenols, phlabotannins, tannins, cardiac glycosides, flavonoids and carbohydrates at significantly varying concentrations while resins and anthraquinones were absent in all the extracts. All the plants extracts showed a significant depreciation in trypanosome motility with increase in incubation period and concentration of the extract. Complete cessation of the trypanosome motility was observed for all the extracts within 40-60 minutes incubation period at 15-20 mg/ml. The most potent extract was *Rogeria adenophylla* at 15mg/ml caused complete cessation of the trypanosomes motility within 40 minutes whereas the least potent extracts were *Musa sapientum* and *Bauhinia rufescens*, both caused complete cessation of the trypanosomal motility within 60 minutes at 20 mg/ml. Diminazene Aceturate, the standard drug, however, caused complete cessation of trypanosomal motility within 30 minutes at 20 mg/ml. This result concludes that, methanol extracts of these plants especially *Rogeria adenophylla* and *Ricinus communis* have antitrypanosomal potential and necessitates the need for *in vivo* investigation of these plants to further validate their trypanocidal potency.

Keywords

Trypanosomiasis, Trypanoside, *In vitro, Rogeria adenophylla, Ricinus communis, Bauhinia rufescens, Musa sapientum*.

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Immunohistochemical and Biochemical Effect of Moringa on Valproate Induced Pulmonary Damage

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ABSTRACT

The respiratory system, involving the lungs and other tissues primarily facilitate gaseous exchange. The functionality of the system can be compromised by several factors, especially endogenously generated oxygen radicals and reactive species. Sodium valproate (SV) is an antiepileptic drug used to treat a wide range of psychiatric conditions, e.g. panic attacks, anxiety, post-traumatic stress, migraine, bipolar disorder etc. Metabolism of SV is associated with the accumulation of toxic metabolites, and depletion of antioxidant reserves. These can lead to tissue necrosis and multiple organ damage. Recently, bioactive foods are amongst the top alternatives for the treatment and management of diseases. *Moringa oleifera* leaves have gained popularity as nutraceutical owing to its plethora nutritional and pharmacological

potentials. In the present study, the pulmonoprotective effect of aqueous-ethanol Moringa extract on SV induced oxidative damage was assessed. Randomly, Sprague Dawley female rats were divided into 4 groups: Control (C), Moringa extract (M), sodium valproate (SV), and sodium valproate + Moringa extract (SV+M). SV and Moringa extract (dissolved in physiological saline) were given at 0.5g/kg b.w. and 0.3g/kg b.w. for 15 days, respectively. Lung tissues were collected from overnight fasted rats on the 16th day. In comparison to C, M and SV+M groups, increased histological damage score, proliferation index and Proliferating Cell Nuclear Antigen (PCNA) positive cell were observed in the SV group. More so, glutathione level, antioxidant enzyme activities, oxidative stress biomarker and inflammatory protein levels were distorted in the SV group. Histological and biochemical observations revealed that Moringa leaves attenuated valproate induced pulmonary damage.

Keywords: Histology, Lungs, Moringa, Pulmonoprotective, Sodium valproate.

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Effect of Monosodium glutamate on selected tissue lipids and haematological indices of neonatal and adult Wistar rats

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ABSTRACT

In this research, pups were administered 4 mg/kg MSG on postnatal days 2, 4, 6, 8 and 10, raised for 32 weeks and afterwards divided into 3 groups (n = 7) and administered saline, 5 and 10 mg/kg body weight of MSG respectively for 6 weeks. Two other groups, not exposed to MSG at neonatal age, were similarly administered 5 and 10 mg/kg body weight of MSG respectively for 6 weeks. The control received saline at postnatal age and for the 6 weeks. At the end of the study, serum and brain lipids and hematological indices were determined and compared. Changes in body and relative brain weights were measured. Body weight was found to decrease ($P<0.05$) in animals exposed to MSG compared with the normal control. The brain weights were also found to increase but non-significantly. Groups exposed to MSG showed a non-significant increases in brain lipids, relative to normal control. There was a decrease in serum lipids of groups previously exposed to MSG at neonatal stage. The decrease was significant in high density lipoprotein cholesterol (HDL-c) of the groups exposed to 4 and 5mg/kg MSG. Wistar rats exposed to MSG at adult stage only showed an increased level of serum lipids, which was significant *($P<0.05$)* in TAG and VLDL-c levels when compared with normal control. The red blood cells counts (RBC), haemoglobin (HGB) and haematocrit (HCT) concentrations decreased in groups exposed to MSG at neonatal stage and received 5mg/kg b.w and 10mg/kg body weight of MSG at adulthood, and was significant *($P<0.05$)* in HGB of group exposed to 4 and 5mg/kg body weight MSG in regard to normal control. The white blood cells (WBC), lymphocytes (LYM), granulocytes (GRA) and platelets (PLT) revealed an increased level *($P>0.05$)* in all MSG-exposed rats, when compared with normal control.

Keywords: Monosodium glutamate, lipids, haematology, obesity, rat models

NSBMB/UPH/MB/200

Role Of Epigenetic Factors In The Development Of Obesity And Type 2 Diabetes Mellitus

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ABSTRACT

Epigenetic factors are increasingly recognized as pivotal contributors to the development of obesity and type 2 diabetes mellitus (T2DM). This review provides an overview of the epigenetic mechanisms, including DNA methylation, histone modifications, and RNA-mediated processes, influencing the pathogenesis of these metabolic disorders. Examining epigenetic signatures in adipose tissue, skeletal muscle, pancreatic islets, liver, and blood, we identify key genes and pathways associated with obesity and T2DM. Dysregulation of DNA methylation patterns, particularly involving genes such as CAPT1A, LEP, INSIGF, NDUFB61, FASN, IRS1, and GNAS, contributes to metabolic dysfunction and inflammation in obesity. Similarly, alterations in histone modifications, particularly H3K4, impact insulin signaling and glucose metabolism. In T2DM, aberrant DNA methylation at genes including PDX1, TCF7L2, PPARGC1A, PAX4, IRS, and GLPIR disrupts insulin secretion and glucose homeostasis. Histone modifications, such as acetylation and methylation, further regulate gene expression in pancreatic β-cells in response to glucose levels. Understanding the intricate interplay between epigenetic modifications, genetic predisposition, and environmental factors holds promise for developing targeted therapies for obesity and T2DM. Additionally, the reversible nature of epigenetic alterations opens avenues for innovative therapeutic strategies to combat these prevalent metabolic disorders.

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Biochemical Effects Of High Concentration Of *Colocasia Esculenta* Flour Fed On Streptozotocin-Induced Diabetic Rats

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ABSTRACT

An endocrine and metabolic disease of the pancreas such as Diabetes Mellitus (DM), is of Public health dimension responsible for 536.6 million cases in the globe. The treatment of DM takes lots of resources, making alternative treatment options like the utilization of medicinal plants like Colocasia Esculenta (CYN) a point of research, hence this study involving biochemical evaluation of streptozotocin-induced diabetic rats (SIDR) fed on high concentration of the flour. CYN was processed into pellets, dried in an oven at 60°C, and adequately stored for further use. Fourty-two male albino rats with weights ranging from 134

and 247 grammes, were purchased, acclimatized and induced with insulin resistance by the administration of 10% fructose diet, thereafter, the rats were made to develop type-2 diabetes mellitus (T2DM) by the intraperitoneal injection of streptozotocin. For 28 days, an intervention formulation consisting of 50:50% ratio of cocoyam flour and commercial rat feed, was administered at the end of which blood samples were collected from the slaughtered animals for various biochemical analyses. The active biological substances in the cocoyam flour included phenolics, D-stilbene, phthalate, and artemisinin, along with more antioxidant minerals than those found in usual rat meals. The formulation exhibited CAT activity of 7.9 units/min and DPPH of 53.2%. Poor glycemic control was suggested by the persistently elevated random blood glucose readings observed along the time trend. Although the results of the liver function tests were similar for the intervention and standard control, the formulation was more effective than metformin at reducing lipid peroxidation and in the hypolipidemic effects. **Conclusion:** Administration of high cocoyam flour concentration demonstrated comparable biochemical effects to the anti-diabetic drug metformin in SIDRs, despite its poor glycemic control. This suggests that cocoyam flour may be applied as a supplemental treatment for people with T2DM.

Keywords: Cocoyam flour, glycemic control, diabetic rats

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Environmentally Relevant Concentrations Of Atrazine, An Endocrine-Disruptive Agrochemical Induces Oxidative Stress In The Testis And Alters Serum Testosterone-Estradiol Ratio In The Adult Nile Tilapia(*Oreochromis Niloticus*) Fish

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ABSTRACT

The aromatase induction hypothesis of atrazine (ATZL) has been established for some lower animal models. This study examines the potential gonadotoxic effect of a triazine agrochemical, ATZL, on the gonads of the Nile tilapia(*Oreochromis niloticus*) fish. The fish were exposed to the Maximum Contamination Level for ATZL (3 ppb) and 10ppb (level detected in well water in South-west Nigeria) for 35 days. The control group were unexposed to ATZL. Thereafter, samples were taken from the 3 experimental groups for evaluating testicular thiobarbituric acid reactive substances (TBARS), nitrite concentrations, hydrogen peroxide (H_2O_2) generation, and reduced glutathione (GSH) level. In addition, male reproductive performance was assessed by quantifying serum testosterone (T) and estradiol (E2) concentrations as well as light microscopy observation of the haematoxylin & eosin stained section of the testis, and the number of spermatogonial stem cells (SSCs) using the Image J software. The results showed that ATZL at both levels of exposure elevated TBARS, GSH, nitrite and H_2O_2generation especially at the 10 ppb concentration. Furthermore, the decline in T and increase in E2 concentrations in both male and female tilapia fish as well as the decrease in the T/E ratio and the diminished population of the SSCs and the histological degenerative changes in the testes support the aromatase induction hypothesis of ATZL effect in aquatic animal models even at values assumed safe by the United StatesEnvironmental Protection Agency. In conclusion, environmental safe levels of ATZL in drinking water impairs T/E ratio, fertility potential, and damage the testes of the freshwater Nile tilapia fish

by oxidative stress mechanisms. Whether these changes are translatable to humans at these environmentally important levels remain to be clarified.

Keywords: Atrazine, gonads, environment, Nile tilapia fish, drinking water, hormones, oxidative stress

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Telfairia occidentalis supplementation attenuate Carbon-tetrachloride-induced Hepatic damage and Oxidative stress

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ABSTRACT

This study investigated hepatoprotective effect of *Telfairia occidentalis* on Carbon-tetrachloride (CCl_4)-induced toxicity in wistar rats. Five experimental groups were used in this study. One group received distilled water and served as normal control. Second group received Carbon-tetrachloride (CCl_4) alone for four days. Third and fourth groups received CCl_4 for four days prior to treatment with 200 mg/kg BW and 400 mg/kg BW *T. occidentalis* aqueous extract for six days respectively. The last group received CCl_4 for four days prior to treatment with Silymarin (100 mg/kg BW) for six days. With exception of normal control rats, all rats received a mixture of freshly prepared CCl_4 in olive oil (1ml/kg BW, 1:1 intraperitoneally) for 4 days. Activities of enzyme markers of hepatocellular damage in serum, aspartate aminotransferase (AST), Alanine aminotransferase (ALT), alkaline Phosphatase (ALP), Lactate Dehydrogenase (LDH), Acid Phosphatase (ACP); antioxidant enzymes, Superoxide Dismutase (SOD) and Catalase (CAT) and oxidative stress molecules: Malondialdehyde (MDA), and Nitric Oxide (NO) in the liver homogenates were measured. Results showed that exposure to CCl_4 orchestrated significant ($p < 0.05$) increases in AST, ALT, ALP, LDH, ACP, MDA and NO and significantly ($p < 0.05$) decreased SOD and CAT. However, treatment with *T. occidentalis* aqueous extract at a dose of 200 mg/kg BW and 400 mg/kg BW alleviated the toxic effects of CCl_4 in a concentration dependent manner. The result of toxicity of CCl_4 and hepatoprotection by *T. occidentalis* were corroborated by histopathological analysis. In conclusion, this study established that *T. occidentalis* possesses and enhanced antioxidant activity, thus attenuating CCl_4-induced hepatic oxidative damage and oxidative stress in wistar rats.

Keywords: Antioxidants, Hepatotoxicity, Liver, Oxidative stress, *Telfairia occidentalis*

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Jatropha Tanjorensis Attenuates Doxorubicin-Induced Cardiotoxicity, Nephrotoxicity and Electrolyte Balance in Rats

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ABSTRACT

Many consumers of *Jatropha tanjorensis* leaves claim that the leaves are nutritious and in addition, possess nutraceutical properties that promote good health. This research investigated the nephroprotective and cardioprotective potentials of aqueous leaf extract of *Jatropha tanjorensis* on Doxorubicin (DOX)-induced renal and cardiotoxicity in rats. Thirty-five male wistar albino rats were used for this study and were grouped as follows: Group 1 rats served as control and received only normal saline orally once daily. Group 2 rats were intraperitoneally given Doxorubicin (15 mg/kg) from day 10 for three consecutive days. Group 3 rats were given 300 mg/kg *Jatropha tanjorensis* orally once daily for 13 days while rats in Group 4 were administered 300 mg/kg *Jatropha tanjorensis* orally once daily for 13 days, and then 15 mg/kg Doxorubicin intraperitoneally from day 10 for three consecutive days. Group 5 rats were administered 100 mg/kg Vitamin C orally once daily for 13 days and then 15 mg/kg Doxorubicin intraperitoneally from day 10 for three consecutive days. After treatment, biochemical and electrolyte tests were done on the serum, and histopathological examination was determined with the kidney and heart tissues. DOX increased Creatine kinase, Urea and Creatinine in the blood samples whereas aqueous leaf extract of *Jatropha tanjorensis* significantly decreased Creatine kinase, Urea and Creatinine as well as improved electrolyte (Sodium and Potassium) function following DOX induction in the rats. The elevation in DOX-induced levels of Urea and Creatinine indicates nephrotoxicity and kidney damage while the elevation of Creatine kinase reflects cardiotoxicity and heart damage which were all corroborated by histopathological findings. In all, this study reveals that leaves of *Jotropha tanjorensis* rich in bioactive agents including flavonoids alleviated the toxic insults of DOX on kidney and heart as well as maintained electrolyte balance thus enhancing organ function, well-being and normal body homeostasis.

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Toxicity Ameliorative Potential of Vitamin E on Concentrations of Testosterone and Dihydrotestosterone in Wistar Rats Concomitantly Administered Artemether-Lumefantrine and Ciprofloxacin

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ABSTRACT

Recently, malaria treatment has involved the use of artemisinin combination therapies (ACTs) and antibiotics. The effect of concomitant administration of Artemether-Lumefantrine, Ciprofloxacin and Vitamin E on the concentrations of testosterone and dihydrotestosterone was assessed. Thirty-five mature albino Wistar rats with average weight of 200 g were used for the study. The rats were sorted into seven groups with five rats in each group. Group 1 served as control while Groups 2 and 3 received therapeutic regimen of artemether-lumefantrine and ciprofloxacin respectively. Group 4 was treated concomitantly with therapeutic regimen of artemether-lumefantrine and ciprofloxacin. Groups 5, 6 and 7 received Vitamin E in addition to the treatments of Group 2, 3 and 4 respectively. The concentrations of testosterone, dihydrotestosterone and testes weight were measured at the end of the study. The result showed a non-significant decreases in testosterone and dihydrotestosterone concentrations following drug administration singly and a significant decrease with concomitant administration of artemether-lumefantrine and ciprofloxacin compared with the control. Administration of Vitamin E along with the drugs singly and concomitantly showed significant increase in testosterone and dihydrotestosterone concentrations compared to the groups without Vitamin E. The same pattern was observed for the testes weight. The result demonstrates that artemether-lumefantrine and ciprofloxacin administration, singly and in combination may be associated with reproductive toxicity as manifested in the reduced concentration of testosterone and dihydrotestosterone concentration. However, concomitant administration of Vitamin E alongside with artemether-lumefantrine and ciprofloxacin exhibited ameliorative potential against artemether-lumefantrine and ciprofloxacin induced toxicity and may be due to the free radical mopping effect associated with Vitamin E.

Keywords: Vitamin E, Artemether-Lumefantrine, Ciprofloxacin, Testosterone, Dihydrotestosterone

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Phytochemical And Anti-Diabetic Analysis Of The Ethanolic Seed And Leaf Extracts Of *Cassia Tora* Linn

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ABSTRACT

Because of the differences in lifestyle of many individual, diabetes mellitus (especially type 2 diabetes mellitus, T2DM) had been a global health challenge of economic importance over the years one of whose etiologies has been linked to the activities of carbohydrate metabolism. This work studied the ability of the seed and leaf extracts of *Casia tora* to lower blood glucose level. This was carried out using 24 healthy Wistar rats grouped into 4 groups. Group I injected with the two separate extracts (seed and leaf) at 100mg/kg, Group II at 200mg/kg, Group II received metformin (standard drug) while Group IV received normal saline, serving as control. The effects were compared across the groups by measuring the blood glucose level using glucometer before and after each treatment. Phytochemical analysis of the seed and leaf extracts of *C. tora* showed the presence of nine (9) phytochemical agents; Alkaloid, phenol, phlobatannins, flavonoids, glycosides, saponins, volatile oil, tannins and protein in varying proportions. Higher in concentrations are alkaloid, flavonoid, saponins and tannins while the

least was phlobatannins. Both extracts from the plant showed higher lowering effects at 200mg/kg than 100mg/kg. Meanwhile, at 100mg/kg, higher lowering effects than metformin was observed. Invariably, both the seed and leaf extracts of *C. tora* have a high inhibitory effect on these enzymes and administration of at least 200mg/kg of the extracts also has a high anti-diabetic effects. With further pharmacological studies on the actual chemotherapeutic index, the seed and leaf extracts of *C. tora* is highly recommended for the treatment (management) of hyperglycemia.

Keywords: *Cassia tora*, Phytochemical, Diabetes mellitus, Wistar rat

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Sulfasalazine-Induced Genotoxic And Apoptotic Effects In Bone Marrow And Semen. Comparative Protective Effects Of Quercetin And Rutin

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ABSTRACT

Sulfasalazine, an anti-inflammatory drug used in the treatment of inflammatory bowel diseases poses a threat to male reproductive potential. With a growing interest in the protective ability of dietary flavonoids against drug-induced male reproductive toxicities, we investigated the protective and or ameliorative potentials of quercetin and its glycoside derivative – rutin in sulfasalazine-induced genotoxicity in the bone marrow and apoptosis in testis and epididymis of male Wistar rats. Thirty rats were divided into six groups (n=5) and orally administered the following for 14 consecutive days: Group 1: 0.5% sodium carboxymethyl cellulose (1ml/kg). Group 2: quercetin (20mg/kg). Group 3: rutin (10mg/kg). Group 4: sulfasalazine (600mg/kg). Group 5: sulfasalazine (600mg/kg) + quercetin (20mg/kg). Group 6: sulfasalazine (600mg/kg) + rutin (10mg/kg). Sulfasalazine increased the frequency of micronuclei in bone marrow of treated rats, evident of its genotoxic potential. Quercetin and rutin decreased this frequency. Sulfasalazine increased p53, caspase 9 and 3 above control levels in semen. These were significantly decreased in sulfasalazine-treated rats co-exposed to quercetin than rutin. TUNEL positive sperm increased in epididymis of sulfasalazine-exposed rats indicative of apoptotic cell death of sperm cells. These were decreased in epididymis of rats when sulfasalazine was administered with quercetin or rutin. However, levels of p53, caspase 9 and 3 as well as TUNEL-stained sperm cells were not elevated in the testis. Sulfasalazine induced apoptosis in epididymis but not testis, and genotoxicity in bone marrow of treated rats. This was significantly ameliorated on co-administration of sulfasalazine with quercetin than with rutin.

Key Words: Sulfasalazine, Quercetin, Rutin, Apoptosis, Semen

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Determining the Effects of Aqueous Seed Extract of Irvingia gabonensis On Selected Biochemical and Parameters In Alloxan-Induced Diabetic Rats

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ABSTRACT

The increasing prevalence of diabetes and the side effects associated with chemical medications underscore the need for alternative non-pharmacological treatments. Irvingia gabonensis is a widely used medicinal herb with potential therapeutic benefits. This study aimed to determine the effects of aqueous seed extract of Irvingia gabonensis on selected biochemical parameters in alloxan-induced diabetic rats. Diabetes was induced in male Wistar rats via intraperitoneal injection of alloxan (150 mg/kg). The rats were randomly allocated into four groups: Group 1 (Normal rats), Group 2 (Diabetic control rats), Group 3 (Diabetic rats treated with Irvingia gabonensis at 200 mg/kg), and Group 4 (Diabetic rats treated with glibenclamide at 5 mg/kg). The extract was administered orally for 28 days. Treatment with Irvingia gabonensis resulted in a significant reduction in blood glucose and glycated hemoglobin levels in diabetic rats compared to the diabetic control group ($P < 0.001$). Additionally, after 28 days of oral administration, the extract significantly decreased the altered biochemical parameters in diabetic rats compared to untreated controls ($P < 0.05$). Specifically, Irvingia gabonensis significantly reduced the elevated levels of alanine aminotransferase (ALT), aspartate transaminase (AST), and alkaline phosphatase (ALP) ($P < 0.05$). Furthermore, administration of Irvingia gabonensis extract demonstrated hepatoprotective and nephroprotective effects, as evidenced by the reduction in liver enzyme levels and improvement in kidney function markers. In conclusion, the aqueous seed extract of Irvingia gabonensis exhibited beneficial effects on selected biochemical parameters in alloxan-induced diabetic rats, indicating its potential as a therapeutic agent for diabetes management.

Keyword: *Vernomia amygdalina*, *Irvingia gabonensis*, Alloxan, Glibenclamide, kidney profile, Glycated hemoglobin.

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Effect of a Poly-herbal mixture in the Hematological parameters of wistar rats

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ABSTRACT

Poly-herbal mixtures are composed of numerous groups of chemical compounds, extracted from herbs and roots of plants. They are characterized by their bitter taste and have been in use

for medicinal purposes. This study investigated the Hematological parameters of wistar rats treated with a poly-herbal mixture using an automated Hematology Analyzer. A total of 20 adult wistar rats were used in this study, grouped into four with five rats per group. Group 1 served as control, treated with feed and water**,** Group 2, 3, and 4 were administered 0.2 ml/kg, 0.4 ml/kg, and 0.6 ml/kg body weight of the poly-herbal mixture respectively. The rats were sacrificed and blood samples collected after a period of 21 days for analysis. Results obtained showed significant ($p<0.05$) decrease in RBC, HGB, MID and Granulocyte of all treated groups ranging from (2.08±2.83 to 0.41±0.08 10^{12}/L), (19.93±17.78 to 9.53±2.03g/dl), (7.80±1.66 to 4.53±3.75%) and (4.87±0.61 to 2.00±0.52%) respectively. There was a significant increase in the White blood count in groups 2 and 4 but insignificant in group 3. Lymphocyte significantly increased in all groups ranging from 8.10±1.91 to 3.47±1.70 (10^9/L). There was an increase in Hematocrit ranging from 36.13±2.91 to 31.73±7.54% for group 2 and 4 but significant decrease in group 3. Results showed significant reduction in mean values of MCV, MPV, PDW, PCT in group 2 while MCHC significantly increased. There was a significant elevation of MCV, PCT and PDW in group 3, and significant reduction in MCHC. This research revealed that, poly-herbal mixture has a significant effect in the hematological indices of wistar albino rats as seen in the elevation and reduction of haematological parameters. White blood cells and lymphatic cells increased significantly, but there was a reduction in red blood cells and haemoglobin which can result to anaemia and low oxygen circulation in the system.

Keywords: Poly-herbal mixture, hematological parameters, automated hematology analyzer, red blood cell.

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Toxicity assessment of *Synclisia scabrida* root extract, a traditionally used medicinal plant in Nigeria

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ABSTRACT

The study examines the safety and toxicity of *Synclisia scabrida* root extract, commonly used in traditional medicine. It investigates the lethal dose (LD_{50}) and sub-chronic oral toxicity of the extract in mice and rats. LD_{50} testing utilized oral dosing in male Swiss mice, while sub-chronic toxicity evaluation was conducted on 24 male Wistar rats over 28 days. Blood samples were collected for analysis, and liver and kidney tissues underwent histopathological

examination. No mortality or observable toxicity in the LD_{50} or sub-chronic toxicity groups. Liver enzyme activities (ALT, AST) remained similar to controls, although ALP increased significantly in the 100 and 200mg/kg groups. Serum albumin concentration remained stable, but mild liver toxicity was noted in the 200mg/kg group histologically. Creatinine concentration significantly decreased in extract-treated groups, while serum HDL levels decreased and TG levels increased compared to control. LDL levels notably increased in rats receiving 200mg of the extract. Hematological parameters remained largely unchanged, with mild liver alterations observed histologically in the 200 mg-treated group. *S. scabrida* root extract stabilized blood parameters, controlled liver enzyme levels, and maintained liver and kidney integrity, indicating its potential for traditional use with caution due to low toxicity concerns.

Key words: $LD_{50,}$ Toxicity, ALT, AST, Creatinine.

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Hepatoprotective Potentials Of *Calliandra Portoricensis* Leaf Ethanol Extract Against Premium Motor Spirit (Pms)-Induced Hepatotoxicity In Male Wistar Rats

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ABSTRACT

Premium motor spirit (PMS) exposure is hazardous to human health with various health consequences. *Calliandra portoricensis*, a medicinal plant used for the treatment of various diseases is attracting wide research interest. This study investigated the hepatoprotective potentials of *C. portoricensis* leaf ethanol extract (CPLEE) against PMS – induced hepatotoxic male Wistar rats. Thirty male Wistar rats (120 – 150 g) were grouped into six groups (n=5). Group 1 received distilled water (normal control), Group 2 received PMS vapour (0.5 mL kg^{-1} b.wt) for 8 weeks with no treatment, group 3 received 200 mg/kg vitamin C while CPLEE doses of 25, 50 and 100 mg/kg b.wt *p.o* were administered once daily for the last 4 weeks to animals in group 4, 5 and 6 respectively. Serum and liver samples were collected and used for the biochemical analyses. CPLEE Phytochemical analysis revealed the presence of flavonoids, tannin, saponin, alkaloids, cardiac glycosides, etc. CPLEE caused a significant decrease ($p<0.05$) in ALT, AST, ALP and LDH activities in the treated PMS groups as well as reducing total bilirubin levels in contrast to the untreated group. The extract showed potentials to scavenge **free radicals** and inhibiting lipid peroxidation generated by PMS, by significantly reducing ($p<0.05$) MDA levels and increasing superoxide dismutase, catalase activities and reduced glutathione (GSH) level in dose dependent manner in the treated PMS groups when compared to the untreated PMS-induced hepatotoxic group. The findings showed that the CPLEE have the capacity to improve liver functions due to its numerous antioxidant phytocompounds antioxidant and protect the liver against PMS-induced oxidative stress and hepatotoxicity.

Keywords: Calliandra portoricensis; antioxidant defence system; MDA; Phytochemicals; premium motor spirit, hepatotoxicity, **oxidative stress**

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Physicochemical analysis of water stored in a freshly used emulsion paint container and its effects on hepatocellular functions of albino rats

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ABSTRACT

The physicochemical analysis of water stored in a freshly used emulsion paint container, and its effect on the liver function of Wistar Rats was studied. Eight healthy Albino rats of both sexes were randomly assigned into two (2) groups of test and control. The control group was fed with normal feed and water whilst the test group was fed with normal feed and the test water sample stored in a freshly used emulsion paint container. Results showed that serum hepatic biomarkers, including Aspartate Amino Transferase (AST), Alanine Amino Transferase (ALT) and Alkaline Phosphatase (ALP) were significantly ($p<0.05$) increased (AST-18.15±492mg/dL, ALT-17.25±2.23mg/dL, ALP-153.0± 10.677mg/dL), when compared to that of control (AST-9.25 ±2.22mg/dL, ALT-9.5±1.29mg/dL, ALP-103.25±7.13mg/dL) respectively. However, the result for bilirubin showed no alteration in both test (10.5±1.08mg/dL) and control (10.5±1.08mg/dL). There was no significant ($p<0.05$) difference in the Haematological parameters which included PCV (44.25±6.23%), platelet (199.0±126.21%), WBC (6.92±3.610%), HB (14.12±1.93%) for test group, except RBC (7.57±66), which was significantly high when compared to control with mean values of 38.0±3.74%, 103.50±32.64%, 3.40±2.03%, 12.15±1.67% and 5.75±0.96% respectively. The mean levels of Differential was significantly ($P<0.05$) high for lymphocyte, (76.25±2.21%) in the test group when compared to control (68.25+2.75%). Similarly, the result was significantly ($p>0.05$) low for neutrophil (15.0±2.16%), Eosinophil (4.5±0.58%) and monocyte, (4.25±0.50%) in test group when compared to control (21.75±1.708%), (6.50±2.31%) and (3.50±1.29%) respectively. Physicochemical parameters of water sample which include, Taste, Conductivity, TDS, TSS, turbidity, Chloride, Odour, BOD, COD, Sulphate, Iron, Lead, Cadmium, gave result which complied with WHO permissible levels, except pH (5.89) and Zinc (1.27ppm). Histopathological examination of test organism showed significant ($p<0.05$) hepatotoxicity characterization such as distortion of lobular architecture, vascular/sinusoidal congestion, diffuse and patchy collection of mononuclear inflammatory cells infiltration. The findings suggest the onset of damage to hepatic cells.

Keywords: Physicochemical analysis, Liver function, Emulsion paint container, Histopathology,

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The Anti-Sickling Potential Of Dried Coconut (*Cocos nucifera*) Root

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ABSTRACT

Sickle cell disease is a group of blood diseases that is genetically inherited which occurs as a result of a point mutation in the β-chain of hemoglobin whereby glutamic acid, a hydrophilic moiety is substituted with valine. Persons with HbSS often develop health problems such as attacks of pain, anemia, bacterial infections, swelling in the hand and feet, and stroke. As of 2013, sub-sahara Africa recorded 3.2 million sickle cell disease cases. In this study, the anti-sickling potential of the root of dried coconut (*Cocos nucifera*) was investigated. Blood samples were collected from sickle cell patients (14-25 years) at the Federal Medical Centre, Yenagoa with their understanding of the benefits of the study. Following confirmation of the blood samples as HbSS using haemoglobin polymerization electrophoresis, further analysis was carried out with the aid of uv-visible spectrometer. The relative percentage inhibition of sickle haemoglobin polymerization by the aqueous extract ranged from 85.33% at a concentration of 50ug/ml to 74% at a concentration of 500ug/ml. The total phenylalanine content in dried root of *Cocos nucifera* extract expressed in ug Total Phenylalanine Equivalent /g plant Extract is 2800 (2800 ugTPE/g plant Extract). Results obtained, showed that the plant extract was more effective in the inhibition of HbS polymerization than Ascorbic acid, a standard anti-sickling agent (<0.005). Dried coconut root extract with the preponderance of nutrients, phytochemicals, amino acids, and other compounds could be beneficial in the management of sickle cell disease.

Keywords: Sickle cell disease, Hemoglobin, Hemoglobin polymerization electrophoresis, *Cocos nucifera* Total Phenylalanine Equivalent/g plant Extract.

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Ameliorative effect of combined aqueous leaf extracts of *Gongronema latifolium* and *Odontonema strictum* in alloxan-induced diabetic Wistar rats

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ABSTRACT

The effect of combined aqueous leaf extracts of *Gongronema latifolium* and *Odontonema strictum* on alloxan-induced diabetic rats was investigated for 28 days. A total of 35 male rats were placed in five groups, tagged Groups I, II, III, IV and V, with each having seven (7) animals. Group I was normal control, they did not receive any treatment but fed with normal diet and water. Diabetes was induced in rats in Groups II to V by a single intra-peritoneal injection of 150 mg $kg^{-1}$of alloxan monohydrate. Group II served as the diabetic control, they did not receive any treatment. Group III received 150 mg kg^{-1} of metformin. Groups IV and V received 100 and 200 mg $kg^{-1}$of combined aqueous leaf extracts respectively. All the

administration was done orally. Changes in body-weight, blood glucose levels, liver enzymes, urea and creatinine, lipid profile and oxidative stress markers were determined using standard methods. A significant increase ($p<0.05$) was recorded in the body weight, while a significant decrease ($p<0.05$) blood glucose levels of rats of diabetic rats treated with 100 and 200 mg kg^{-1} of combined extracts when compared to untreated diabetic rats. The combined extracts significantly brought to normal the liver enzymes, urea and creatinine, lipid profile and oxidative stress markers when compared with normal and diabetic controls. The results, therefore, suggest that the combined aqueous extracts of *G. latifolium* and *O. strictum* have hypoglycaemic, hepatoprotective and antioxidant effects on alloxan-induced diabetic rats, hence, can be used as herbal treatment for diabetes.

Keywords: *Gongronema latifolium*, *Odontonema strictum*, Alloxan, Diabetic, Blood glucose

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Protective Potential Of The Combination Of Cucumber (*Cucumis Sativus*) And Cabbage (*Brassica Oleracea*) On Ethanol-Induced Ulcer In Male Wistar Rats

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ABSTRACT

Peptic ulcer is an ulcerative disorder characterized by abdominal pains which often lead to gastrointestinal bleeding and/or perforation with a high mortality risk. This study aimed to provide scientific validation for the folkloric use of the vegetables (cucumber and cabbage) in Nigerian ethno-medicine for the treatment of peptic ulcer. Cucumber and cabbage were used to formulate juice extract (JE) consisting of 80% cabbage and 20% cucumber. Thirty-five rats were randomly divided into 7 groups: Group 1 (naïve control) and group 2 (negative control) received distilled water, groups 3 – 7 were pre-treated with cimetidine (50 mg/kg b.wt), rabeprazole (20 mg/kg b.wt), 1.0 mL, 1.5 mL and 2.0 mL of JE, respectively, for 14 days after which the animals were fasted overnight and induced with gastric ulcer using 1 mL of absolute ethanol on day 15. Percentage inhibition of ulceration, gastric volume, total acidity, malondialdehyde, TNF– α and interleukin – 6 levels, H+/K+-ATPase, SOD and CAT activities were determined. Data were analyzed using one-way ANOVA at $p < 0.05$. The 2.0 mL of JE had the highest percentage ulcer inhibition (94.7%) when compared to cimetidine (52.6%) and rabeprazole (73.7%). Groups 3-7 significantly ($p < 0.05$) reduced gastric volume, total acidity, malondialdehyde, TNF– α, interleukin – 6 and H+/K+-ATPase activity/level, as well as significantly ($p < 0.05$) increased SOD and CAT activities when compared to the negative control. The 2.0 mL of JE exhibited highest gastro-protective effect. Further studies to identify the main gastro-protective compound(s) is recommended.

Keywords: Anti-inflammatory, Antioxidants, *B. oleracea*, *C. sativus*, Gastro-protective, Peptic Ulcer.

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Effect of a Cannabis Substance Votz Az Super Sour OG on Oxidative Stress and Reproductive Parameters of Male Wistar Rats

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ABSTARCT

Cannabis is now legal in many areas for recreational or medicinal use. Cultivators breed various subspecies to create hybrids and specific strains. This study aimed to evaluate the effect of a cannabis hybrid strain, AZ SUPER SOUR OG on oxidative stress and reproductive parameters of male Wistar rats. Thirty-six male rats were grouped into six groups of six rats each. Group 1 was the control (received no treatment); group 2 was given vitamin E (1000mg); groups 3 and 4 were given AZ SS per o.s (1500mg and 4500mg of AZ SS respectively) and groups 5 and 6 were given AZ SS in combination with vitamin E per o.s (1500mg of AZ SS + 1000mg of vitamin E and 4500mg of AZ SS + 1000mg of vitamin E respectively) per kg b.w. There was a significant decrease at $p \leq 0.05$ in the levels of the antioxidant biomarkers (SOD, CAT and GSH) in the AZ SS treated groups when compared to the control. Although there was a decrease in the levels of the reproductive hormones (testosterone, LH and FSH) in the AZ SS treated groups; only the decrease observed in the testosterone level (1.05 ± 0.12 and 0.87 ± 0.12) was significant at $p \leq 0.05$ when compared to the control (4.32 ± 0.04). Vitamin E mildly ameliorated the effect of AZ SS.

Keywords: Cannabis Sativa, hybrid strains oxidative stress, reproductive hormones, Wistar rats.

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Diabetic Nephropathy Could be Associated with Biomarkers of Oxidative Stress and Not N-acetyl-alpha-D-Glucosaminidase (NAG) Polymorphism

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ABSTRACT

Introduction: Diabetes is the seventh leading cause of mortality globally. Over 422 million people are diabetic, particularly in low-and middle-income countries. The burden of this epidemic is also rising in sub-Saharan Africa. Research has shown incremental morbidity and mortality in diabetic patients, especially due to diabetic nephropathy. Also, laboratory diagnosis is pivotal in the assessment of biochemical derangement that will eventually cause the diabetic complications. It will be of prognostic value if more renal biomarkers could be identified and serve as an early marker of renal insult.
Aim: The aim of this research work is to establish the levels of several biomarkers associated with nephropathy in diabetic patients from Kano, Nigeria.

Methodology: In the current study anthropometry (weight and height), glycemic index, renal function markers, N-acetyl-alpha-D-glucosaminidase (NAG) concentration, sequencing analysis using Sanger's method and lipid peroxidation level were determined in ten healthy subjects as control, ten diabetics as also positive control, ten diabetic nephropathy and ten nephropathy patients all four groups having comparable socio-economic status.
Results: The results showed significantly ($p<0.05$) high levels of HbA1c (a long term marker of glycemic control), FBG (monosaccharide macromolecule as energy source), pH, CRP (inflammatory marker), MDA (a marker of oxidative stress), cystatin C (nephropathology biomarker), urea (proteins end product serving as kidney biomarker), creatinine (renal biomarker), body mass index (BMI) and low levels of estimated glomerular filtration rate (eGFR) in diabetic nephropathy patients compared to diabetics and nephropathy groups. There was no significant difference in high-sensitivity C-reactive protein (hsCRP) and NAG concentration in diabetic nephropathy compared to diabetic and nephropathy groups. The results further revealed moderate positive correlation of NAG concentration with microalbumin and albumin in the study groups and correlation with other renal function markers. Furthermore, sequencing analyses showed no polymorphism of Cytosine to Thymine at locus 40695717(C>T) of the Chromosome 17 in all the study groups.
Conclusion: Conclusively, results showed increased risk of cardiovascular and oxidative stress with null genetic interference of NAG in diabetic nephropathy compared to both diabetics and nephropathy patients.

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Ameliorative Effect of the Aqueous Extract of *Syzygium aromaticum* on Cisplatin-Induced Reproductive Organ Damage in Male Wistar Rats

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ABSTRACT

The ameliorative effect of the aqueous extract of *syzygium aromaticum* (clove) on cisplatin-induced reproductive organ damage in male Wistar rats was investigated. Forty male Wistar rats (100-125g) grouped into 8 of 5 rats each were obtained from the Department of Biochemistry, University of Port Harcourt Animal House. Groups 1 to 3 were the normal control (uninduced untreated group), Negative control (induced non-treated), positive Control (induced but treated with reference dug) respectively. Groups 4-8 were fed and administered with various concentrations (500, 1000, 1500 and 2000 and 2500 mg/kg) respectively of aqueous extract of *S. aromaticum* plant. Using standard laboratory methods, biochemical tests and histological examinations were carried on the blood samples and reproductive organs after 28 days of the experiment. Results obtained revealed that the extract of *Syzygium aromaticum* had a stabilizing and ameliorative effect on the haematological parameters, oxidative stress markers, hormonal assay, and semen analysis. This was evidenced significantly in groups 8, were obtained values for hormonal assay (Testosterone 3.89±0.38 IU/L, LH 4.11±1.08 IU/L, FSH 4.08±0.16IU/L) showed a remarkable improvement compared to the negative control. Oxidative stress markers, haematology indices, and semen analysis of group 8 were shown to be relatively non-significantly different from the normal control values (group 1). This could be attributed to the high level of the antioxidant and anti-inflammatory phytochemicals

reported earlier on this plant extract. Therefore, aqueous extract of *S. aromaticum* at 2500 mg/kg has ameliorative effects on cisplatin-induced reproductive organ damage on male Wistar rats when compared with the other groups as well as the reference drug.

Keywords: Infertility, Histology, Testes, Male Reproductive organ, Oxidative Stress Enzymes

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Prophylactic Efficacy of C. mannii Seed Oil on Cyclophosphamide-Induced Hepato-Renal Toxicity in Wistar Albino Rats

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ABSTRACT

This study evaluated the prophylactic efficacy of Cucumeropsis mannii seed oil on cyclophosphamide-induced hepato-renal toxicity in Wistar albino rats. The prepared samples were analysed for various nutritional components including vitamin content, mineral content, and total flavonoid content. The chemical analyses were done using standard methods. Thirty six male Wistar albino rats were randomly assigned into 6 groups (A, B, C, D, E, and F) of 6 rats each. The mineral analysis was carried out according to the procedure of Association of Official Analytical Chemistry (A.O.A.C., 1997). Determination of phytochemical composition was carried out by the method of Harborne (1973). Kidney function parameters were determined using commercial kits following the manufactures instruction. Liver function parameters; serum albumin, total bilirubin and total protein were done by the methods of Doumas et al. (1971), AST and ALT activities were assayed by method of Reitman and Frankel (1957) whereas the activities of ALP was by method of Plummer (1978). Phytochemical analysis of C. mannii seed oil revealed the following order of occurrence of the constituents: flavonoids=tannins=phenol=terpenoids>glycosides>alkaloids>HCN. Vitamin content showed tocopherol to be the highest vitamin while pyridoxine was the least. Cucumeropsis manni seed oil showed magnesium to be highest mineral while phosphate was the lowest. The results of flavonoid profile showed that there were forty compounds identified, with rhamnazin (4.239 ± 0.15) being the highest and isorharmnetic (0.006 ± 0.04) was the lowest in concentration. Cyclophosphamide-induced toxicity was evidenced by significant ($p<0.05$) elevation in the activities of ALT, AST and ALP and levels of MDA, albumin, total bilirubin, conjugated bilirubin, creatinine, urea, BUN, sodium and potassium in relation to the normal control. Administration of CMSO and Omega 3 fatty acid before administration of the cyclophosphamide in rats led to an increase in the body weight. However, administration of Cucumeropsis mannii seed oil and Omega 3 oil significantly ($p<0.05$) ameliorated the toxicity caused by cyclophosphamide in non-dose dependent manner. The protective potentials of the CMSO on the biochemical markers were corroborated by the histology of the kidney and liver. This study suggests that prophylactic administration of Cucumeropsis mannii seed oil could be of clinical importance in the management of cyclophosphamide-induced hepato-renal toxicity in albino rats.

***Keywords**: hepatotoxicity, cucumeropsis mannii seed oil, cyclophosphamide, phytochemical, omega 3 oil.*

SUB-THEME 2
NUTRITIONAL BIOCHEMISTRY

NSBMB/UPH/NB/001

Microbiological Contamination of Food Sold Within Daura Metropolitan, Katsina State

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ABSTRACT

The safety of food is a basic requirement of food quality. A total of 10 street food samples (Jollof rice, beans, and white rice) were randomly purchased from 10 different vendors within Daura metropolitan. Safe food is a basic human right despite many foods are frequently contaminated with naturally occurring pathogenic microorganisms. Such pathogens cannot be detected organoleptically (seen, smelled, or tasted), but can cause disease of varying severity, including death especially if the way they are conserved during exposition for sales provides conditions for those microorganisms to grow and reach considerable levels of contamination. The samples were transported in ice to the laboratory. The samples were bacteriologically analyzed using pour plate techniques and sub-culture. Pour plate techniques were done by carrying out serial dilution of the sample after which the third tube where picked and 1 ml of each sample where pipette into a nutrient agar, the plate was then incubated for 24 hours at 37□C after which the plate was examined for growth. Sub-culture was done using bacteriological agar. All screened food samples had varying levels of bacterial growth ranging from 1.0×10^6 to 3.0×10^6 cfu/ml. Sixty percent of the food samples had bacterial count above the acceptable limits (104 cfu/ml) and forty percent of the samples had bacterial count less than (‹ 104 cfu/ml). Four bacterial species were isolated from the food samples. Staphylococcus aureus, salmonella spp, E. coli, Klebsiella spp,. More than one pathogenic microorganism was isolated from jollof rice and beans. The finding revealed that street foods are potential vehicles for transmitting food-borne illnesses thus the need to develop practical strategies geared toward street food safety.

Keyword: Microbiological; Contamination; Foodborne; Diseases; Food; Daura; Pathogens.

NSBMB/UPH/NB/002

Effect of Storage Temperature and Time on the Phenolics and Vitamin C Content of Moringa Juice and Hibiscus Juice Blends

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ABSTRACT

Introduction: The Total phenolics and Vitamin C content of most fruits and vegetables were found to be a function of time and temperature. The aim of this research was to determine the effect of storage temperature and time on the total phenolics and Vitamin C content of Moringa blends and Hibiscus juice blends. The vitamin C and total phenolics content was determined using standard folin-ciocalteu reagent (FCR) quantitative methods. The total phenolics content of moringa juice blend were found to be 110.5±26.3 at the first month,109.4±25.7 at the 2nd month and the third month value was 107.7±24.3mgGAE/100g at 4°C. At a temperature of 28°C, the phenolics contents were 376.4±9.3 at the first month, 208.6±14.6 at the second month and the third month value was 112.9±32.3 mgGAE/100g. Vitamin C Content were found to be 15.4±2.5 at the first month,14.2±0.4 at second month and third month value was 13.9±0.30mg/100g at 4°C and 13.3±1.0 at the first month,9.4±1.0 at the second month and the third month value was 9.1±0.7 mg/100g at 28°C. Also the total phenolics and Vitamin C content of Rosselle juice blend were found to be 55.7 ±6.8 at the first month, 52.9±5.4 at the second month and the third month value was 52.4±5.7mgGAE/100g at 4°c and Vitamin C content were found to be 35.21±1.6 at the first month,34.8±1.6 at the second month and the third month value was 34.6±1.4mg/100g at 4°C. The total Phenolics content were found to be 932.3±17.1 at first month,150.6±15.9 at the second month and at third month value was 52.47±7.5mgGAE/100g at 28°C and the Vitamin C Content were found to be 34.7±1.6 at the first month, 8.8±0.4 at the second month and the third month value was 7.2±0.2mg/100g at 28°C. Therefore, it can be deduced that the total phenolics content and Vitamin C Content of Rosselle juice blend decreases substantially at 28°C compared to 4°c. Moringa and Rosselle juice blend stability was better at 4°C than 28°C within three months of storage.

Keywords: Moringa, Roselle, Juice blend, Vitamin C, Phenolics.

NSBMB/UPH/NB/003

The Effect of High Fat Diet Supplemented With *Allium sativum* (Garlic) on Lipid Profile of Wistar Rats

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ABSTRACT

This research aims to assess the lipid profile parameters of wistar rats fed high fat diet supplemented with 4% inclusion of *Allium sativum* (garlic). Nine male wistar rats of about 120g weight were randomly grouped into three groups comprising three rats each. Normal control group, negative control group and test groups were maintained on normal rodent diet, high fat diet and high fat diet supplemented with garlic respectively. The diets were formulated according to standard procedure. After eight weeks of feeding, the rats were weighed, anaesthetized using chloroform, sacrificed and blood samples were collected. The plasma was

collected after centrifugation at 1500g for 15 minutes and take to Federal Medical Center Katsina for analysis according to Randox Laboratory Limited United Kingdom. All the raw data obtained in this research were statistically analysed using SPSS version 22 (considering $p<0.05$ to be significant). And values were presented as mean ± standard error. The proximate composition of the formulated diet reveals that all the diets contain nutrients that are in line with the proximate composition of related work as reviewed in literature. The result of the lipid profile (total cholesterol, triglycerol, high density lipoproteins and low-density lipoproteins) shows no significant difference between all the groups with the exception of HDL. While the Atherogenic Index shows significant difference between the negative control and the normal control group, the Coronary Risk Index shows no significant difference between all the groups. Based on the result presented, garlic is having a positive effect on lipid profile. It can be recommended that the impact of different doses of garlic supplementation should be investigated to determine the optimal dosage that can provide health benefit and further research should be carried out to explore the mechanism through which garlic affect the lipid profile of wistar rat fed high fat diet.

Keywords: High Fat Diet, *Allium sativum*, Total Cholesterol, Low Density Lipoproteins, High Density Lipoproteins and Triglycerol.

NSBMB/UPH/NB/004

Assessment of Pytochemical Content, Antioxidant and Antimicrobial Properties of Methanolic Extract Of *Khaya grandifoliola* Bark

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ABSTRACT

Research was conducted at Kwara State Polytechnic, P.M.B. 1375, Ilorin, Kwara State, Nigeria. *Khaya grandifoliola*, also called African mahogany has been reported to possess a host of ethnomedicinal uses such as anticancer, antidiabetic, antimicrobial, anti-sickling, anti-ulcerogenic, and hepatoprotective. This study aimed to identify the phytochemical composition, antioxidant and antimicrobial properties of methanolic extract of *Khaya grandifoliola* bark. The stem bark of Khaya grandifoliola was air-dried at room temperature under shade and pulverized using an electrical grinder under strict hygienic conditions and extracted with methanol. Phytochemical screening was carried out using different procedures. Antioxidant activity was determined using various *in vitro* methods such as Hydrogen peroxide (H_2O_2) scavenging, 1,1-Dipheny-2-picrylhydrazyl (DPPH), total antioxidant capacity (TAC), ferric reducing antioxidant power (FRAP), 2,2-azinobis (3-ethylbenzthiazoline)-6-sulfonic

acid) (ABTS) and hydroxyl radical scavenging assay. Antimicrobial activity of the extract was evaluated against some bacteria and fungi species. Phytochemical screening revealed the presence of alkaloids, tannins, flavonoids, steroids, lactones, diterpenes, saponin and anthraquinone. The extract exhibited pronounced antioxidant activities in the various antioxidant activity assays tested. The extract displayed antimicrobial activity against *Candida albicans, Aspergillus sp., Pseudomonas aeruginosa, Eschericia coli, Klebsiella pneumoniae,* with the exception of *Staphylococcus aureus*. This finding supported the traditional ethnomedicinal uses of *Khaya grandifoliola* bark, it also indicated that the extract is an effective free radical scavenger, a potent source of natural antioxidant and antimicrobial agent.

Keywords: *Khaya grandifoliola*, antimicrobial, antioxidant, phytochemicals, ABTS, DPPH

NSBMB/UPH/NB/005

Phytochemical Analysis, Mineral Composition and In -Vitro Antioxidant Activity of Ethyl Acetate Extract of *Jatropha Tanjorensis* (Hospital Too Far) Leaves

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ABSTRACT

Jatropha tanjorensis is a medicinal plant that has been used for various purposes in traditional medicine. However, the phytochemicals, minerals, and antioxidant activities of its ethyl acetate extract have not been studied before. In this study, we aimed to determine these parameters using various analytical methods. Qualitative and quantitative phytochemical analysis were carried out, atomic absorption spectroscopy (AAS) and flame photometry was used to determine the mineral content of the ethyl acetate extract of the leaves. The in vitro antioxidant activity was determined using 2,2-diphenyl-1-picrylhydrazyl (DPPH) and ferric reducing antioxidant power (FRAP) assays. The results showed that the extract contained saponins, tannins, alkaloids, flavonoids, and anthraquinones, with high amounts of tannins and saponins. The extract also contains high levels of sodium, phosphorus, calcium, and magnesium, with a trace amount of zinc. The extract exhibited high antioxidant activity in both DPPH and FRAP assays, with a low IC_{50} value of 0.003 mg/ml. These findings suggest that the ethyl acetate extract of *Jatropha tanjorensis* leaves has a notable phytochemical and mineral composition, as well as a remarkable antioxidant activity, which may have potential applications in pharmaceutical and nutritional fields.

Keywords: *Jatropha tanjorensis*, phytochemicals, minerals, antioxidants activities, ethyl acetate extract.

NSBMB/UPH/NB/006

Assessment of Dietary Pattern, Dietary Diversity and Nutritional Status of Secondary School Adolescent Students in Batagarawa Local Government Area of Katsina State

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ABSTRACT

Background: Adolescence is a transition period between childhood and adulthood associated with increased nutritional needs due to increased growth rate and body composition changes during puberty. There is paucity of information on dietary pattern, factors governing food choices, nutrients intake, and consequently nutritional status of secondary school adolescents. **Aim:** This study assessed the dietary pattern, dietary diversity and nutritional status of secondary school adolescents in Batagarawa Local Government Area (LGA) of Katsina State. **Methods:** The cross-sectional study was conducted among 200 adolescent students (males and females) aged 12-19 years randomly selected from five secondary schools in Batagarawa LGA. Interview, 24-hour recall and food frequency questionnaires were used to obtain socio-demographic characteristics and information on dietary pattern and diversity of the study participants. Additionally, anthropometric measurements and blood samples were taken for biochemical analysis. Data were analyzed using descriptive, chi-square, t-test and correlational analyses. **Results:** There were 48.5% males and 51.5% females. Furthermore 37.5% and 62.5% lives in urban and rural areas respectively. The dietary diversity of the participants was low (37.5%), average (54.5%) and high (8%). The waist-to-hip ratio of the participants were 55%, 32% and 13% as low, moderate and high, respectively. There were 78.5% underweight students. The mean values for albumin, iron, calcium, retinol and ferritin were 1.63±1.55 g/dl, 4.69±2.56µmol/L, 8.44±2.08mg/dl, 7.98±3.49 µmol/L and 63.43±44.31 ng/ml, respectively. **Conclusion:** There appears to be high incidence of underweight among the study participants. This calls for action like incorporation of nutrition education in secondary school curriculum, among others, to encourage good nutrition practices among adolescents for growth and development.

Keywords: Adolescents, nutrition status, dietary pattern, dietary diversity.

NSBMB/UPH/NB/007

Comparative analysis of Vitamin, Mineral and Phytochemical Composition of *Justicia carnea, Mucuna pruriens* and their combined aqueous Leaf extracts

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ABSTRACT

Justicia carnea (Acanthaceae) and Mucuna pruriens (Fabaceae) leaves are used separately in traditional medicine for diverse therapeutic benefits and both possess anti-anaemic effects. This study was undertaken to compare the vitamin, mineral and phytochemical compositions of *Justicia carnea*, *Mucuna pruriens* and their combined aqueous leaf extracts. The analysis were carried out using standard biochemical methods. Vitamin analysis showed that Vitamins B1, B2, B6, B9, C and E were significantly higher ($p<0.05$) in *Justicia carnea* (1.41 mg/g, 2.34 mg/g, 0.07 mg/g, 0.78 mg/g, 27.68 m/g and 0.29 mg/g respectively) than in *Mucuna pruriens* (0.31 mg/g, 1.14 mg/g, 0.04 mg/g, 0.05 mg/g, 4.55 mg/g and 0.23 mg/ respectively) and combined extract (0.75 mg/g, 1.51 mg/g, 0.04 mg/g, 0.36 mg/g, 12.83 mg/g and 0.24 mg/g respectively. Vitamin A was significantly higher in *Mucuna pruriens* (4.61 µg/g) than in *Justicia carnea* (2.81 µg/g) and combined extract (3.27 µg/). In the Mineral analysis, there was no significant difference ($p<0.05$) in the composition of the minerals in all the extracts except Calcium which was significantly higher in *Mucuna pruriens.* The phytochemical analysis showed no significant difference in the Tannin, Oxalate and Phytate composition of the three extracts; Terpernoid and Alkaloid were significantly higher ($p<0.05$) in *Justicia carnea* while Flavonoid and Phenol were significantly higher ($p<0.05$) in *Mucuna pruriens*. Saponin was significantly higher ($p<0.05$) in the combined extract. Alkaloid was not detected in *Mucuna pruriens.* These findings indicate that Vitamin, Mineral and phytochemicals are found more in the extracts when used separately than in their combined form.

Keywords: *Justicia carnea*, *Mucuna pruriens*, combined extract, Vitamin, Mineral, Phytochemical

NSBMB/UPH/NB/008

Phytochemical Screening and Antimicrobial Activity of Jackfruit Leaves Methanol Extract and the Butanol Fraction

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ABSTRACT

The leaf extract and metabolites of Jack fruit possess several bioactive compounds of relevant medicinal significance. This study investigated the physiochemical properties and anti-microbial activity of the methanol extract and butanol fraction. The extract and fraction were screened for their microbial activity on typed strains of bacteria and fungi. In the preliminary antimicrobial screening the methanol extract displayed better anti-microbial and anti-fungal activities when compared with the butanol fraction *E. coli* and B.cereus at IZD of 16mm and 13.8mm. The minimum inhibition concentration (MIC) of the methanol extract and butanol fraction against the test organisms ranged from (0.156-5mg/m L) where the lowest of the methanol extract as recorded against *E. coli* (0.156mg/m L) and butanol fraction against B.cereus (0.313mg/L). The physiochemical screening revealed the leaf as having heavy presence of flavonoids, saponins, tannins, alkaloids although more in the methanol extract at above 2 while that of butanol fraction less than 1. Based on the available data, it was concluded that Artocarpus heterophyllus leaf exhibits medicinal activity and opens a broader avenue for further therapeutic investigations for its usefulness.

NSBMB/UPH/NB/009

Heavy Metals Content and Polycyclic Aromatic Hydrocarbons Present in Selected Infant Milk Formulae and Cereals Sold in Port Harcourt, Nigeria

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ABSTRACT

Excessive exposure to contaminants like heavy metals and polycyclic aromatic hydrocarbon in infant formulae and cereal consumption can have harmful effects on the human health. This work investigated five infant-milk formulae (AA, BB, CC, DD and EE) and five cereals (NN, CL, NM, NC and FF) sold in Port Harcourt, analysing them for heavy metals and polycyclic aromatic hydrocarbons **(**PAHs). Heavy metals in the samples were analysed using absorption spectroscopy, and Gas Chromatography-Mass Spectrometry was used for the PAHs. The concentration of iron, arsenic, lead and chromium found in infant-milk formulae ranged from 5.35-16.51, 0.02-0.79, 0.01-0.21, 0.02-0.30mg/kg respectively. For infant cereals, concentrations were in the ranges of 2.43-64.52, 001-2.42, BDL-0.21, 0.04-2.40mg/kg for Fe, As, Pb and Cr respectively. Cadmium level was below detectable limit except for sample DD (0.02 mg/kg) and FF (0.94mg/kg) for infant-milk formulae and cereal respectively. PAH levels in infant-milk formulae were mostly below detectable limit except for dibenz(a,h)anthracene (0.01mg/kg) in samples AA, BB and CC. Sample DD and EE showed varied concentrations with pyrene (2.31±0.00mg/kg) and Indeno(1,2,3-cd) pyrene (12.48±0.35mg/kg) having the highest values in DD and EE respectively. Cereals NN and CL had no detectable PAHs, while NM, NC and FF showed concentrations ranging from 0.00-1.66, 0.00-2.73 and 0.00-2.70mg/kg respectively. The study suggests that some of the samples (AA, BB, CC, NN and CL) are safe

for infant consumption, while others may need further investigation and monitoring to avoid heavy metals and PAHs contamination.

Keywords: PAHs, heavy metals, infant formula, cereals

NSBMB/UPH/NB/010

Nutrition Profile of *Triticum durum* and *Triticum aestivium*

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ABSTRACT

Common wheat (*Triticum durum* and *Triticum aestivium*) are very good sources of nutrients for humans. However, there is little or lack of comprehensive data regarding the nutritional profile of the two varieties of wheat (*Triticum durum* and *Triticum aestivium)*. In this study, the nutritional profile (proximate, minerals, vitamins, amino acids, and fatty acid) composition of two varieties of wheat was analyzed. In proximate composition except for moisture, no significant difference was observed in all the parameters analyzed. The results obtained showed that all the mineral parameters are significantly different ($p<0.05$) with Mg, K, Na, and Ca having the highest amount. Only vitamins B_1, B_2, B_3, and vitamins C were found in both the samples while the other vitamins (B_6, B_9, B_{12}, vitamin A, E) were not detected. Eighteen amino acids (essential and non-essential) were detected in the samples with glutamic acid, leucine, and arginine having higher amounts while tryptophan, cysteine, and methionine were detected in small amounts. In the result of fatty acid composition, saturated fatty acids (myristic, palmitic, and arachidic acid) were only detected, while in unsaturated fatty acids, only oleic and linoleic acids were detected. This study reveals that *Triticum durum* and *Triticum aestivium* are very good sources of carbohydrates, protein fiber, minerals (Mg, K, Ca), vitamins (B_1, B_2, C), and amino acids.

Keywords: Proximate, Amino Acid, Fatty Acid, *Triticum durum, Triticum aestivium*

NSBMB/UPH/NB/011

Phytochemical and Antibacterial Properties of Aqueous Leaf Extract of *Stereospermum Kunthianum*

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ABSTRACT

The present study assessed the phytochemical and antibacterial properties of aqueous leaf extract of *Streospermum kunthianum.* Aqueous extract of *Stereospermum kunthianum* was prepared from fresh whole plants bearing fruits and leaves growing wild within the University of Maiduguri. Phytochemical screening was performed according to standard methods. Antibacterial activity testing was done using agar well diffusion. At the same time, minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) were determined using the agar dilution technique and by the lowest concentration that kills 99.9% of the initial bacterial population respectively. The aqueous extract of *S. kunthianum* revealed the presence of steroids, coumarins, cardiac glycosides and saponins and the absence of flavonoids, tannins and alkaloids. The extract demonstrated significant antibacterial activity against *E. coli* and *A. hydrophila* having the zones of inhibition of 18 mm at 75 mg/ml and 20 mm at 50 mg/ml respectively. *E. coli* had the lowest MIC (25 $mgml^{-1}$) while *A. hydrophila* had the highest MIC value of (30 $mgml^{-1}$) respectively. In this study, the MBCs for *E. coli*, *S. aureus, A. hydrophila* and *P. aeruginosa, were* 35 mg/ml, 40 mg/ml, 30 mg/ml and 40mg/ml respectively. The extract's effectiveness against *E. coli* and *A. hydrophila* supports the traditional use of the plant in treating diseases. The resistance of *S. aureus* and *P. aeruginosa* for all concentrations of the extract was noted, making it necessary to search for other plants extracts against these organisms.

Keywords: antimicrobial agents, medicinal plants, antibacterial resistance, infectious diseases, MBC, MIC.

NSBMB/UPH/NB/12

Prevalence of Household Food Insecurity and Micronutrient Deficiencies Among In-School Adolescents in Sabon Gari, a Peri-Urban Municipality, Kaduna, Nigeria

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ABSTRACT

Adolescence is a period between 10–19 years characterized by fast pubertal changes and high nutrient needs. The nutrient needs are often not met due to poor dietary intake resulting from household food insecurity. The current study determined the prevalence of household food insecurity among in-school adolescents and its impact on micronutrient deficiencies using standard protocols. The study reveals most of the in-school adolescents from households with limited social and economic resources to be males (57.52%) with a mean age of 16.18±1.75

years. Eighty-seven (87) percent of the adolescents with parent's monthly incomes under ₦100,000 (~USD80) had lower educational attainment for both the head of household and caregiver, 82.3 % trek to school, and 66.37% use boreholes as their primary source of drinking water. A total of 83.3% of the households experience food insecurity to varied degrees, with adolescents who are mildly food insecure having the highest frequency at 73.7%. The minimum dietary diversity (MDD) score, assessed using unquantifiable 24-hour dietary recall shows less than 30% of adolescents met their recommended dietary diversity. The anthropometric indices, BMI-for age (BAZ) and Height-for age (HAZ) z-scores reveal high prevalence of thinness (61.06%) and stunting (57.52%) respectively. A significantly ($p<0.05$) higher prevalence of stunting and thinness in the food insecure (FI) than the food secure (FS) group was recorded. The result of this study revealed higher percent deficiency of calcium, iron, vitamin A, and zinc in the FI group than the FS. It also highlighted a significantly ($p<0.05$) lower levels of these micronutrients in the FI group than the FS. Conclusively, the adolescents whom are mostly from resource poor settings are food insecure and mostly consume micronutrient poor diets, not met their MDD, and are significantly deficient of zinc, calcium, vitamin A, and iron.

Keywords: Adolescent, Food insecurity, Micronutrient deficiencies, Nutritional assessment, Prevalence.

NSBMB/UPH/NB/13

Assessment of Pytochemical Content, Antioxidant and Antimicrobial Properties of Methanolic Extract of *Khaya grandifoliola* Bark

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ABSTRACT

Research was conducted at Kwara State Polytechnic, P.M.B. 1375, Ilorin, Kwara State, Nigeria. *Khaya grandifoliola*, also called African mahogany has been reported to possess a host of ethnomedicinal uses such as anticancer, antidiabetic, antimicrobial, anti-sickling, anti-ulcerogenic, and hepatoprotective. This study aimed to identify the phytochemical composition, antioxidant and antimicrobial properties of methanolic extract of *Khaya grandifoliola* bark. The stem bark of Khaya grandifoliola was air-dried at room temperature under shade and pulverized using an electrical grinder under strict hygienic conditions and extracted with methanol. Phytochemical screening was carried out using different procedures. Antioxidant activity was determined using various *in vitro* methods such as Hydrogen peroxide (H_2O_2) scavenging, 1,1-Dipheny-2-picrylhydrazyl (DPPH), total antioxidant capacity (TAC), ferric reducing antioxidant power (FRAP), 2,2-azinobis (3-ethylbenzthiazoline)-6-sulfonic

acid) (ABTS) and hydroxyl radical scavenging assay. Antimicrobial activity of the extract was evaluated against some bacteria and fungi species. Phytochemical screening revealed the presence of alkaloids, tannins, flavonoids, steroids, lactones, diterpenes, saponin and anthraquinone. The extract exhibited pronounced antioxidant activities in the various antioxidant activity assays tested. The extract displayed antimicrobial activity against *Candida albicans, Aspergillus sp., Pseudomonas aeruginosa, Eschericia coli, Klebsiella pneumoniae,* with the exception of *Staphylococcus aureus*. This finding supported the traditional ethnomedicinal uses of *Khaya grandifoliola* bark, it also indicated that the extract is an effective free radical scavenger, a potent source of natural antioxidant and antimicrobial agent.

Keywords: *Khaya grandifoliola*, antimicrobial, antioxidant, phytochemicals, ABTS, DPPH

NSBMB/UPH/NB/014

Antidiabetic Effects of Butanol Fraction of *Mucuna flagellipes* Seeds on High Fat Diet and Streptozotozin Induced Diabetes in Male Wistar Rats

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ABSTRACT

Type 2 diabetes mellitus is a complex heterogeneous disease linked with genetic conditions and lifestyle, especially dietary components. The aim of the study is to determine the anti-diabetic effect of butanol fraction of *Mucuna flagellipes* seeds on diet and streptozotocin-induced diabetes in wistar rats. Twenty-five male wistar rats were used for this study of which twenty rats were fed with high fat diet (HFD) for 8 weeks followed by a single dose 35 mg/kg i.p streptozotocin injection. Group 1 and 2 served as normal and HFD diabetic controls, while group 3 was administered glibenclamide, and group 4 and 5 were administered butanol fractions of *M. flagellipes* (200 and 400 mg/kg p.o) for 14 days. The HFD diabetic control had significant increase ($p<0.05$) in glucose, triglycerides, cholesterol and insulin resistance. Administration of n-butanol fraction significantly decreased ($p<0.05$) glucose, triglycerides, total cholesterol, insulin resistance, ALT and AST activities when compared with the HFD diabetic control. The histopathology of the liver and pancreas revealed that the group treated with 400 mg/kg butanol fraction had fewer micro vascular fat deposit in the liver and moderate proliferation of islets in the pancreas compared to the HFD diabetic control. The immunohistochemistry of the pancreas revealed that the 400 mg/kg of butanol fractions had marked positivity of the islets compared to the HFD diabetic control. In conclusion, this study found that *M. flagellipes* had the potential to decrease glucose and improve the lipid profile thus suggesting its use in the management and treatment of diabetes.

Keywords: *Mucuna flagellipes*, Diabetes, Butanol fraction, Streptozotocin, High fat diet

NSBMB/UPH/NB/015

Effect of Processing Methods on the Nutrients and Anti-Nutrients of Castor Seed Cake

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ABSTRACT

Despite the leading role of poultry production in the livestock industry, it is not without challenges. In present times, the high cost of feeding poultry birds is alarming and has forced most farmers into formulating poultry feeds themselves while some others have left the business. This is mainly due to high cost of raw materials such as soybean, maize, fish meal and bone meal that constitute about 70 % of poultry feeds, there is exacerbating rise in the cost of feed and commercial feed millers are compromising quality of feed in terms of nutrient composition and quantity. On this note, alternative crops with high protein content and can be cheaply sourced could be best fit for replacement of these feed materials. One plant that may be used as a replacement for soybeans in poultry feed production is castor seed meal. Castor plant (*Ricinus communis* L.) is one among the underutilized crops with rich protein value of about (38.58 %). However, one of the setbacks in its utilization is that, it contains toxic products and allergens, mainly ricin, ricinine and the allergens. The castor seed cake was processed using seven processing methods that involve cooking, fermenting, toasting, combine cooking and toasting, cooking and fermenting, fermenting and toasting, and cooking, toasting and fermenting. The nutritional compositions and anti-nutrients were determined according to the AOAC (2000) except, for ricin and ricinine that was determined by ELISA. The results revealed that anti-nutrients reduction over ten times its value while retaining essential nutrients with combination of cooking and fermenting, and cooking, toasting and fermenting giving best reduction 0.04mg/100g and 0.02mg/100g respectively but the combination of cooking and fermenting best improve protein content of 40.38 % . The result of this study has shown that castor cake could be used as source of protein inclusion in animal feed.

Keywords: Ricin, anti-nutrients, fermentation, allergens, castor cake.

NSBMB/UPH/NB/016

Effects of Daily Comsumption of Red Wine (Toma®) on Liver Function Indices in Female Rats

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ABSTRACT

Red wine is an alcoholic beverage that is alleged to exert a broad spectrum of health promoting action. The effect of daily consumption of red wine (TOMA®) on liver function parameter of albino rat was investigated. Twenty female albino rats (average weight 105g-237g) were used. A commonly red wine we acquired. The rats were divided into four groups. Group 1 serve as the control group control group and fed with normal feed and given clean water (adlibitum), group 2, 3, 4 were administered water supplemented with 10, 20, 30 percent of red wine respectively. The study lasted for four weeks. Blood samples were collected via ocular puncture thereafter analysed. Liver functions were determined enzymatically using commercial reagent kits and procedures were followed in evaluation of different liver enzyme parameters alanine transferase (ALT), aspartate transaminase (AST), alkaline phosphatase (ALP) as well as total and direct bilirubin levels. The results showed that the liver enzymes activity to increase significantly ($p<0.05$) in administered group compared to the control group (group A). Results obtained from the research indicates an increased levels of the liver enzyme alanine transaminase (U/I), which was slightly ($p<0.05$) high in group 2 (5.40+/-1.66), when compared to the control group (4.00+/-0.00). Alkaline phosphatase (U/I), was observed to show a significantly higher ($p<0.05$) in the administered groups compared to the control group. Aspartate transaminase (U/I) was however observed to be significantly higher ($p<0.05$) in control group (21.40+/-5.38) when compared to the administered groups (11.20+/-3.05, 14.80+/-4.20 and 13.60+/-2.87). Total bilirubin (µmol/I) was observed to be significantly higher ($p<0.05$) in control group 5.65+/-1.68), when compared to the administered group. Direct bilirubin (µmol/I) was observed to be significantly higher $p<0.05$) in administered group 2, 3 and 4 (21.30+/-0.58, 22.28+/-0.09 and 22.43+/-0.18). In conclusion, the finding suggest that daily consumption of red wine might have a mixed effect on liver parameters and markers.

NSBMB/UPH/NB/017

Assessment of the Phytochemical Composition and Anti-Lipidemic Properties of Aqueous Leaf Extract of Ficus Capensis Thunb on Hyperlipidemic-Induced Adult Male Wistar Rats

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ABSTRACT

The study evaluated the anti-lipidemic properties of the aqueous extract of *Ficus capensis* leaf on high fat diet-induced hyperlipidemic wistar rats. Preliminary phytochemical screening revealed the presence of tannins, saponins, flavonoids and cardiac glycosides. Thirty adult male

wistar rats (100g-130g) were divided into six groups of five rats each. The aqueous plant extract was administered to test groups via oral gavage for four weeks. Effect of the aqueous extract on some biomarkers of liver, lipid profile was assessed. Effect on some haematological indices were also determined. Histopathology of the liver of hyperlipidemic-induced wistar rats was carried out to determine the extent of liver damage. Evaluation of the data obtained from this study indicated a significant ($p \leq 0.05$) dose-dependent decrease in cholesterol, triglycerides and LDL levels (1.92mmol/l, 0.86mmol/l and 0.94mmol/l) in treated groups, compared to untreated control group (2.94mmol/l, 1.16mmol/l and 1.72mmol/l) respectively. Most significant decrease was observed at 200mg/kgbwt of the aqueous extract administration. HDL levels increased significantly ($p \leq 0.05$) at 200mg/kgbwt and 400mg/kgbwt aqueous extract administration (0.88mmol/l and 0.72mmol/l) respectively in treated groups, when compared to the untreated control group (0.60mmol/l). Serum levels of AST, ALT and ALP decreased significantly ($p \leq 0.05$) at (57.40 u/l, 79.80 u/l and 18.20 u/l), compared to the untreated control group (79.20 u/l, 113.40 u/l and 39.40 u/l) respectively, with the highest decrease also observed at 200mg/kgbwt of aqueous extract administration. Total white blood cell count (TWBC) and platelet count showed decreased levels compared to the untreated control group, however, Haemoglobin (Hb) and packed cell volume (PCV) increased significantly ($p \leq 0.05$) in all treated groups. Histopathology of the rat liver in treated groups showed no hepatoxic effects. The result obtained from the study showed that the aqueous leaf extract of *Ficus capensis* (thunb) has pharmacologically active substance(s) responsible for the above effects. However, there is a dose-dependent effect.

Keywords: Hyperlipidemia, *Ficus capensis*, high fat diet, liver function, lipid profile, histopathology.

NSBMB/UPH/NB/018

Effects of *Egeria radiata* Shell Powder Supplemented Diet on the Lipid Profile of *Gallus gallus domestica*

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ABSTRACT

This study evaluated the effects of *Egeria radiata* shell powder supplemented diet on lipid profile of *Gallus gallus domestica*. A total of 20 chicks at day old obtained from Agric International and Trade (Agrited) limited were used for the study which lasted for a period of 7 weeks. The study comprised of 4 groups of 5 animals each. Group 1, the control, received pelletized Standard feed alone (Starter and Finisher) throughout the period of the study. Group 2 were fed pelletized standard feed supplemented with 5% *Egeria radiata* shell powder. Group

3 were fed pelletized standard feed supplementated with 10% *Egeria radiata* shell powder while Group 4 were fed pelletized standard feed supplemented with 15% *Egeria radiata* shell powder. At the end of the experiment, serum was obtained from the animals and used for determination of lipid profile. The results showed that the inclusion of *Egeria radiata* shell powder (5%) in the diet significantly ($P \leq 0.05$) increased HDL levels in *Gallus gallus domestica*, relative to control. This effect on HDL levels of *Gallus gallus domestica* may be due to the bioactive properties of *Egeria radiata* shell powder such as the antimicrobial and antioxidant properties which have been reported earlier in literature. This entails a positive influence on lipid profile of the animals, which could lead to prevention of atherosclerosis or Cardiovascular Heart Disease in humans who consume chicken or use chicken products in their daily nutrition.

Keywords: *Gallus gallus domestica; Egeria radiata* Shell Powder; Dietary Supplementation; Lipid Profile, Cardiovascular Heart Disease.

NSBMB/UPH/NB/019

Evaluation of Phenolic Profile and Antioxidant Properties of Fresh African Palm Wines.

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ABSTRACT

Palm wine is a popular alcoholic beverage produced traditionally from the sap of *Elaeis guineensis* (oil palm) and *Raphia hookeri* (raffia palm) by small-scale farmers for family consumption and subsistent commercial purposes. The phenolic profile and total antioxidant capacity (TAC), as well as ferric reducing antioxidant power (FRAP) and total flavonoids (TF) content of fresh palm wines from *E. guineensis* and *R. hookeri*, were determined using standard methods. The results showed that fresh raffia and oil palm wines with pH values of 3.77 ± 0.12 and 3.64 ± 0.10, and low ethanol contents of 1.07 ± 0.02 and 1.14 ± 0.03 %, had TF contents of 897.41 ± 1.89 and 1135.29 ± 2.65 µg/g CAE respectively. The TAC and FRAP of the palm wines were found to be non-significantly ($p>0.05$) different at 17.14 ± 0.08 and 16.45 ± 0.53 µg/ml, and 18.52 ± 0.09 and 18.43 ± 0.49 µg/ml for the raffia and oil palm wines respectively. There were appreciably more diverse phenolic compounds in the oil palm wine than in the raffia palm wine with proanthocyanin (5.59 µg/ml), coumaric acid (0.82 µg/ml), catechin (4.27 µg/ml), kaempferol (28.35 µg/ml) and ephedrine (14.91 µg/ml) being detected in the oil palm wine only. Ferulic acid, lunamarine, eugenol, flavone, flavonones, anthocyanin, and chlorophenol were detected in both fresh wines. The study showed that palm wines were rich sources of phenolic compounds with high antioxidant potential.

Keywords: Antioxidants, *Elaeis guineensis*, phenolic compounds, *Raphia hookeri*, wine.

NSBMB/UPH/NB/020

Effect of Cooking on Nutrient Composition of Some Selected Prepared Diets Consumed in Kano State-Nigeria

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ABSTRACT

Food processing involves various processes or a step taken to make food edible and it varies not only with nature of the recipe but ethnicity. It may have effect(s) on the nutrient and non-nutrient content of the prepared diets. The effect of cooking on nutrient contents of prepared diets and their ingredients/recipe consumed in Kano State-Nigeria was studied. The recipe and a fraction of prepared diets were dried and ground into powder for the analysis. Proximate, minerals, vitamins and antinutrients contents of the samples were determined using standard methods. The evaluated carbohydrates and energy content of the prepared diets are significantly higher ($P<0.05$) compared to estimate from the total recipe (EFTR) used except in *danwake*. The EFTR protein, fat, fiber, ash and moisture were significantly higher ($P<0.05$) compared to that of prepared diets except for Fiber in *danwake*. All the EFTR mineral contents of prepared diets were significantly higher ($P<0.05$) compared to that of prepared diets except for Cr and K in rice and beans and TMW SWKS respectively. The EFTR anti-nutrient were significantly higher ($P<0.05$) compared to that of prepared diets except for Tannins, C. glycosides and phytates in *danwake* and rice and beans. The findings of this study show that effect of cooking on nutritional content of prepared diets varies with the nutrient.

Key words: Nutrients/Nutrients Composition, Cooking, Prepared Diets,

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Nutritional Potential and the Effect of Ethanol and Aqueous Extracts of Plukenetia Conophora Leaf on the Body Weight and Blood Glucose Concentrations of Diabetic Rats

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ABSTRACT

Proximate composition and energy value, macro-mineral concentration, percentage daily value (%DV) , nutrient rich index (NRI) and the effect of ethanol and aqueous extracts of *Plukenetia conophora* leaves on the body weight and blood glucose concentration of diabetic rats were determined using standard methods. The pharmacological model was 120mg/kg b.w. (via intraperitoneal) alloxan monohydrate induced diabetic rat model, with the ethanol and aqueous extracts respectively administered orally at 200mg/kg and 500mg/kg respectively and glibenclamide administered as reference control at 5mg/kg b.w. Chemical analysis showed that all the samples were rich in crude fiber (17.7%; %DV: 63.21), ash (11.57%), carbohydrate (57.14%; %DV:47.71), energy (254.05Kcal/100g ; %D.V. : 19.96) . Spectrophotometric analysis data revealed potassium concentration (68.07mg/kg; %DV: 1.45) as highest while Sodium concentration (0.51mg/kg; %D.V.: 0.02) was the lowest. The potassium to sodium ratio was high (136.1) while the sodium to potassium ratio was very low (0.008) and these ratios may reveal good cardiovascular health effect of the leaf. Nutrient Rich Index (NRI) based on macronutrients and macro minerals was estimated to be 16.47. Data on the effect of the ethanol extract and aqueous extract of the leaves of *P.conophora* on the body weight and blood glucose level of the rats revealed that the extracts significantly ($p < 0.05$) , time and dose dependently restored the body weights towards normal compared to the diabetic control. The extracts also significantly ($p < 0.05$), time and dose dependently lowered blood glucose concentration towards normal in treated rats. The nutritional and nutraceutical potentials of the leaves of *P.conophora* shown in this study suggest its possible use in food as cheap, effective and safe anti-diabetic agent for the management of diabetes mellitus and its associated complications.

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Effect of *Ficus capensis* wine Consumption on Biochemical Parameters in the Serum of Adult Wistar Rats

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ABSTRACT

Ficus capensis wine is a red wine and rich in antioxidant compounds. However, recent reports indicated that there is an inverse relationship between dietary intake of antioxidant rich drinks and incidence of human diseases. This present study was carried out to investigate the health benefit effects of various volumes of *Ficus capensis* wine consumption on biochemical parameters in the serum of male Wistar rats. Twenty (20) rats were divided into four (4) groups comprising of five (5) rats per group. The rats were treated for 28 days, after which they were sacrificed and serum obtained for biochemical analysis of aspartate aminotransferase (AST),

alanine transaminase (ALT), alkaline phosphatase (ALP), superoxide dismutase (SOD), glutathione (GSH), catalase (CAT), and malondialdehyde (MDA) using standard procedures. The various doses showed enhance GSH levels and decreased activity of AST. The results revealed dose-dependent effects, with the medium dose (350 ml/70kg) significantly ($p \leq 0.05$) increasing ALP activity and the low dose (250 ml/70kg) enhancing SOD activity, suggesting potential benefits for bone health and antioxidant defence. Significant ($p \leq 0.05$) decrease in the activity of alanine transaminase in group 3 (11.5 ± 1.32 lμ/l) and group 4 (10.75 ± 1.55 lμ/l) when compared to group 1 (control) (19.75 ± 2.39 lμ/l) was also recorded. However, the activity of alanine transaminase in group 2 (29.25 ± 11.98 lμ/l) indicated insignificant ($p \leq 0.05$) increase when compared to group 1 (control) (19.75 ± 2.39 lμ/l). Decrease in catalase activity was recorded in all groups. Though, statistically significant ($p \leq 0.05$) decrease in the activity of catalase was shown in rats subjected to 350 ml/70kg (114.75± 3.31 u/M) of *Ficus capensis* wine when compared to rats administered distilled H_2O (123.0 ± 0.41 u/M). A significant ($p \leq 0.05$) decrease in malondialdehyde was recorded in rats subjected to group 2 (2.46 ± 0.13 μmol/l), group 3 (2.54 ± 0.13 μmol/l) and group 4 (2.72 ± 0.20 μmol/l) when compared to Group 1 (control) (3.88 ± 0.33 μmol/l). Thus, it is paramount to conclude that the decreased activity of alanine transaminase, aspartate aminotransferase, catalase, malondialdehyde and enhanced GSH and SOD levels in the tested animals showed an improved antioxidant capacity of *Ficus capensis* wine and did not significantly impose oxidative stress in the serum of the experimental rats.

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GC-MS Profile, *In-Vitro* Anti-Inflammatory, Anti-Oxidant and Anti-Diabetic Properties of Chloroform Extract of *Irvingia gabonensis* Leaf

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ABSTRACT

Irvingia gabonensis (Bush mango) leaf is a non-timber forest product employed for nutritional and medicinal purposes. It is reportedly used locally in the management / treatment of an array of pathological conditions. This study assessed the Gas Chromatography – Mass Spectrometric (GC-MS) profile, *in-vitro* anti-inflammatory, antioxidant and anti-diabetic properties of the chloroform extract of *Irvingia gabonensis* leaf. Standard methods were employed in carrying out all analyses. Chloroform extract of *Irvingia gabonensis* leaf potently inhibited α-amylase, α-glucosidase and lipoxidase activities, Nitric oxide (NO), 2,2-azinobis-(3-ethylbenzthiazoline-6-sulfonic acid) (ABTS), 2,2-diphenyl-1-picrylhydrazyl (DPPH) and Hydrogen peroxide (H_2O_2). The extract also exhibited high membrane stabilization effect, Oxygen radical absorption capacity (ORAC), Ferric reducing antioxidant power (FRAP), and

Total antioxidant capacity (TAC), at varying concentrations, when compared with the standard reference drugs utilized. In addition, GC-MS analyses of the chloroform extract revealed the presence of some bioactive phytocompounds with documented medicinal activities, including: 11-Octadecenoic acid, methyl ester; Ethyl Oleate; 9,12 -Octadecadienoic acid, methyl ester; Squalene; Hexadecanoic acid, methyl ester; 9-Octadecenoic acid (Z)-, 2-hydroxy-1-(hydroxymethyl)ethyl ester; Hexadecanoic acid, ethyl ester; Heptadecanoic acid, heptadecyl ester; Oleic acid; Heptadecanoic acid, 16-methyl-, methyl ester; Undec-10-ynoic acid, tetradecyl ester; Nonacos-1-ene; 9-Octadecenoic acid (Z)-, Octadecyl ester, Erucic acid among others. Preliminary phytochemical screening of chloroform extract also revealed the presence of some important phytochemicals. It is concluded that, chloroform extract of *Irvingia gabonensis* leaf is a promising anti-inflammatory, antioxidant and anti-diabetic agent that could be important in the mitigation of inflammation, oxidative stress and diabetes mellitus.
Keywords: Gas Chromatography-Mass Spectrometry, *Irvingia gabonensis*, Antioxidant, Anti-inflammatory, Anti-diabetic

NSBMB/UPH/NB/024

Biochemical Evaluation of Protein-Enriched Cassava Peels and its Application in Broiler Feeds Formulation

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ABSTRACT

This study investigated the biochemical characteristics of cassava peels fortified with yeast leaf extract culture (YLEC) and their application as a substitute for maize in broiler feed formulation. YLEC was prepared by blending 2 kg of fresh elephant grass with 20 liters of water, augmented with 1 liter of palm wine. The culture underwent one day of cultivation with periodic mixing. Following this, the culture was introduced to 4 kg of cassava peels and underwent fermentation for 7 days. Samples were used to formulate five broiler starter feeds: control, 50% cassava peels (CP), 100% cassava peels (CP), 50% fortified cassava peels (FCP), and 100% fortified cassava peels (FCP). Results showed increased soluble and total protein concentrations (267.9 mg/g and 11.3%, respectively) ($p < 0.05$) and a significant reduction ($p < 0.01$) in cyanide concentration from 69.1 mg/kg in the control to 15.5 mg/kg in fortified cassava peels post-fermentation. Moreover, fortified cassava peels exhibited elevated glucose levels, reducing sugar concentrations, and enzymatic activities (amylase and protease) compared to unfermented peels ($p<0.05$). pH, total phenolic content, and total flavonoid

content also increased significantly ($p<0.05$) following fermentation. Broiler chicks fed with 50% FCP formulated feed showed considerable weight gain compared to those on a standard poultry feed. Furthermore, examination of alkaline phosphatase (ALP), alanine aminotransferase (ALT), and aspartate aminotransferase (AST) activities showed no significant difference between fortified cassava peels and standard poultry feed ($p > 0.05$). These findings suggest the potential use of fortified cassava peels as an alternative raw material in livestock feed formulation.

Keywords: Fortified cassava peels, Broiler feed, Fermentation, Biochemical parameters

NSBMB/UPH/NB/025

Investigation of the Effect of *Justicia Secunda* on the Meat Quality and Health of Broilers

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ABSTRACT

This study aimed to ascertain the effects of aqueous and ethanol leaf extracts of *Justicia secunda* on broiler meat quality and health. A total of 288 (Ross 208) broilers weighing 48 ± 1 g were used for the study. The birds were randomly divided into 9 groups of 4 replicates with 8 birds per replicate. The following treatments were applied: basal diet, basal diet plus 0.75 g aqueous leaf-extract/kg feed, basal diet plus 0.5 g aqueous leaf-extract/kg feed, basal diet plus 0.25 g aqueous leaf-extract/kg feed, basal diet plus 0.75 g ethanol leaf-extract/kg feed, basal diet plus 0.5 g ethanol leaf-extract/kg feed, basal diet plus 0.25 g ethanol leaf-extract/kg feed, basal diet plus 0.5 g Albiovit/kg feed, and basal diet plus 0.5 g B-vit-extra/kg feed. This experiment lasted for 56 days. Blood weight, drip loss, cooking loss, red blood cell count, white blood cell count, packed cell volume, and hemoglobin count were all determined using standard methods. The highest drip loss (5.01 ± 0.44 %) and cooking loss (45.01 ± 0.57 %) were recorded in the group fed basal diet alone, which were significantly higher ($p < 0.05$) than the values recorded in the other groups. The test groups had significantly high ($p < 0.05$) red blood cell counts, but low white blood cell compared to the group fed basal diet alone. Thus, it could be deduced from the results that aqueous and ethanol leaf extracts of *J. secunda* can serve as alternatives to commercial growth promoters in promoting broiler meat quality and improving its health as well.

Keywords: *Justicia secunda*, broiler, drip loss, cooking loss, meat quality, health performance

NSBMB/UPH/NB/026

Effect of Soybean, Groundnut, Crayfish-inclusion and Vitamin C-Fortified Formulated Food Blends on Biochemical, Hematological, Protein Quality and Performance Indices in Weanling Albino Rats

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ABSTRACT

In this study, food staples comprising of *Zea mays* (maize), *Sorghum bicolor* (guinea corn), *Glycine max* (soybean), *Arachis hypogea* (groundnut) and *Procambarus clarkii* (crayfish) were traditionally processed and formulated into maize-guinea corn based weaning diets at 16% protein level. A replica of each diet was formulated with inclusion of vitamin C (50 mg/100 g diet). Fifty-four 3-week old weanling albino rats (*Rattus norvegicus*) weighing between 36-39 g were placed into 13 groups of 4 rats per group and administered different diet groups ranging from maize- guinea corn base diet alone, through staples-inclusive diet (singly and in combination) and their vitamin c fortified replica diets, and standard commercial infant formula (Cerelac®) diet. Animals were sacrificed on the 28th day from onset of feeding and evaluated for biochemical, hematological and biological parameters; and sensory evaluation, also conducted on the diets. Results showed significant increase in serum concentrations of protein, urea and creatinine in the staples-inclusive diets compared to base diet and also in the vitamin C- fortified diets compared to non-fortified diets. The formulated diets caused significant increase in the levels of red blood cell (RBC), hemoglobin (Hb) and packed cell volume (PCV) and insignificant changes in white blood cell (WBC) and platelet counts compared to base diet. These parameters were insignificantly affected by diet containing both soybean and groundnut compared to that of soybean alone. Fortification with vitamin C also increased the levels of these parameters significantly. The presence of soybean and other food staples, singly or in combination in the diet caused significant increase ($p < 0.05$) in total body weight gain and organ weights compared to control. Incorporation of food staples enhanced the protein quality of the diets while fortification with vitamin C increased only the biological value. On the acceptability rating, only the base gruel-crayfish mix showed significantly higher taste and overall acceptability. Therefore, the inclusion of the food blends comprising of soybean, groundnut and crayfish improved the nutritive content, hematopoietic potential, protein quality, taste and overall acceptability of the maize-guinea corn based weaning diet. These were further improved by fortification of the diets with vitamin C, while crayfish played a prominent role in taste and overall acceptance of the formulated diets. Fortification also significantly bridges the gap between the formulated weaning diets and Cerelac®, a standard commercial weaning formula in Nigeria.

Keywords: Soybean, groundnut, crayfish, vitamin C, weanling, biochemical, hematological, protein quality, sensory evaluations.

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Evaluation of Proximate, Anti-Nutrient, Mineral and Heavy Metal Composition of Processed Cassava Product (Garri) Sourced from Different Markets in Port Harcourt Metropolis.

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ABSTRACT

Fried cassava product (Garri) was procured from 4 different markets in Port Harcourt Metropolis namely; Choba (CHB), Borokiri (BRK), Oil Mill (OML) and Mile 3 (ML3) Markets. Samples were collected once a week, over a period of 4 weeks and analysed for proximate, anti-nutrient, mineral and heavy metal compositions using standard methods. The moisture, carbohydrate and ash compositions of samples from all the markets were found to be statistically the same; all within acceptable limits except for moisture. Crude protein was generally below acceptable limits in all samples, with OML garri being significantly lower than other. However, there were significantly ($p < 0.05$) higher Lead content (1.29 + 0.10 mg/kg) and lower oxalate (0.16 + 0.14 %) and zinc (11.49 + 1.38mg/kg) compositions in CHB Garri compared to other markets. There were also significantly higher iron (10.17 + 0.30 mg/kg) and lower Manganese (1.91 + 0.11 mg/kg) concentrations in BRK samples. The OML samples revealed significantly higher contents of crude lipid (0.32 + 0.02 %), oxalate (0.46 + 0.05%) and hydrogen cyanide (HCN) (18.05 + 1.74 %) and lower compositions of crude fiber (2.77 + 0.16 %) and saponin (0.87 + 0.11 %) compare to other market samples. Crude lipid (0.11 + 0.01 %) and iron (5.68 + 0.19 mg/kg) were significantly lower in ML3, with oxalate (0.42 + 0.05 %) and calcium (10.22 + 0.81) in higher proportion compared to other samples. While the garri samples from all the markets showed values for phytate, oxalate and tannins that are within acceptable levels, the concentrations of lead, saponin and HCN were above acceptable consumption limits. Continuous consumption of raw or improperly processed garri from these sources could be a potential health risk including liver, kidney, thyroid dysfunctions; bowel irritation and vitamin/ nutrient malabsorption.

Keywords: Proximate, anti-nutrient, mineral, heavy metal, composition, cassava, garri.

NSBMB/UPH/NB/028

Assessment of Proximate, Anti-Nutrient, Mineral and Heavy Metal Compositions of Processed Wet Cassava Chips (Tapioca) Sourced From Different Markets in Port Harcourt Metropolis.

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ABSTRACT

The proximate, anti-nutrient, mineral and heavy metal compositions of processed wet cassava chips (Tapioca) sourced from different markets in Port Harcourt Metropolis was assessed in this study. Chips were purchased from Choba (CH), Borokiri (BK), Oil Mill (OM) and Mile 3 (M3) Markets, all within Port Harcourt Metropolis. Samples were collected once every week, for a period of 4 weeks and analyzed for proximate, anti-nutrient, mineral and heavy metal compositions using standard methods. Proximate analysis of the samples from all the markets revealed insignificant difference in mean values for moisture, carbohydrates, crude proteins crude lipid and ash. The ash content was within permissible limit (< 5%) and moisture content, above limit (> 5%). The carbohydrate contents of all the samples were within acceptable limit (60-75%) but the protein content was far below acceptable limit in food (> 15%). The crude fiber was significantly low in CH sample (0.78 + 0.33%) but within acceptable limit (< 5%) while the rest samples showed significantly high compositions. The Sample also had significantly high concentrations of saponin (1.34 + 0.11 mg/100g) and iron (7.82 + 0.36 mg/kg) compared to the other market samples (except OM). BK sample revealed significantly higher levels of phytate (0.50 + 0.84 mg/100g) and lower levels of oxalate (0.08 + 0.01 mg/100g), lead (0.37 + 0.05 mg/kg) and iron (5.29 + 0.25mg/kg) compared to other samples. The OM sample showed significantly low phytate level (0.33 + 0.05 mg/100g) and high iron (6.12 + 1.21mg/kg) and zinc (18.15 + 0.84 mg/kg) contents. The least concentrations of saponin (0.85 + 0.07 mg/100g), manganese (0.66 + 0.09mg/kg) and iron (5.19 + 0.017mg/kg) with significantly higher levels of oxalate (0.26 + 0.04) and calcium (9.87 + 0.67mg/kg) were found in M3 sample. Phytate, oxalate and tannin levels in all the markets are within acceptable limits (< 2.64, < 0.3 and < 12mg/100g respectively) while saponin and HCN are above limits (< 0.5 mg/ 100g and 10 mg/kg respectively). As these chips are usually processed and eaten as salads, the high levels of these anti-nutritive factors could predispose to chronic organ dysfunctions of the liver, kidney and thyroid and may also promote negative nutrient interactions leading to deficiency. Adequate processing and nutrient enhancement before consumption is recommended.

Keywords: Proximate, Anti-nutrient, Mineral, Heavy Metal, Composition, Cassava, Tapioca.

NSBMB/UPH/NB/029

Enhancement of Antioxidant and Total Polyphenol Contents in *Newbouldia laevis* Leaf Extract Through Macroporous Resin Treatment.

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ABSTRACT

Newbouldia laevis leaf is widely applied in herbal medicine for treating epilepsy, rheumatic swelling, pains, and wounds. In this study, we reported the improvement of the yields of the total polyphenol and antioxidant contents of leaf extracts of *Newbouldia laevis* after an enrichment operation with X5 Macroporous Adsorptive Resin (MAR). Ethanol extract obtained from *Newbouldia laevis* leaf was intermittently stirred in X5 for 40 min to achieve MAR -polyphenol adsorption. Elution of MAR-bound polyphenols was achieved by ethanol treatment. The total phenols, total flavonoids, 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activities, Ferric reducing ability of the plasma (FRAP) activities and inhibitory potentials against Pb-induced hemolysis and Fenton-chemistry mediated peroxidation of egg yolk homogenate were determined for the crude and polyphenol-rich extract of *Newbouldia laevis* leaf. The result showed that, compared with the crude extract, the MAR-enriched extract improved the DPPH radical scavenging, FRAP, and the anti-peroxidative activity of *Newbouldia laevis* leaf extract by more than 2 folds. Our data could aid the utilization of this abundant medicinal plant resource for functional food development, drug development and industrial applications.

Keyword: Polyphenol, *Newbouldia laevis*, DPPH, antioxidant, macroporous resin, natural products, flavonoids

NSBMB/UPH/NB/030

Nutritional and Phytochemical Compostion, and *In Vitro* Functional Properties of Ripe and Unripe Plantain (*Musa Paradisiaca*) Fruit Peels

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ABSTRACT

Ripe and unripe peels of *Musa paradisiaca* (Plantain) fruits were investigated for their nutritional and phytochemical compositions, as well as their antioxidant and antihyperglycemic activities. Proximate compositions of the ripe and unripe peels, respectively, were as follows: moisture, 23.17 ± 0.03% and 16.31 ± 0.01%; carbohydrate, 38.15 ± 0.02 and 39.80 % ± 0.04 % Dry Matter; ash, 13.5 ± 0.01 and 12.07 ± 0.01 % DM; crude fibre, 8.63± 0.01 and 12.63 ± 0.01% DM; crude fat, 12.11 ± 0.01 % and 13.10 ± 0.02 % DM; and crude protein, 4.40 ± 0.06 and 6.15 ± 0.14% DM. Phytochemicals present in the aqueous extract of the peels were alkaloids, flavonoids, phenols, reducing sugars, and amino acids. High Performance Liquid Chromatography-Mass Spectrometry (HPLC-MS) of the phytochemicals indicated the presence of 15 compounds, including phenolic compounds, sterols, and sitoindosides, with quercetin constituting about half (49.13% for the unripe and 41.75 for the ripe). DPPH radical scavenging activity of the unripe peel extract (IC_{50} = 207.7 µg/mL) was significantly higher than that of the ripe peels (IC_{50} = 300.7 µg/mL). Reducing power was significantly lower for the unripe than for the ripe peel extracts, with the latter exhibiting activity comparable to that of the standard, gallic acid. The alpha-amylase inhibitory activity of the aqueous extract of the unripe peels was high (IC_{50} = 23.9 µg/mL) and that of the ripe peels, modest (IC_{50} = 87.95 µg/mL). The results of this study support the utilization of *M. paradisiaca* peels in human and animal nutrition, with their aqueous extracts exhibiting a high potential for application in the management of type-2 diabetes.

Key Words: *Musa paradisiaca* fruit peels, proximate composition, phytochemical classes and composition, antioxidant activity, α-amylase inhibitory activity

NSBMB/UPH/NB/031

Determination of the Bioactive Components of Dichloromethane extracts of Piper guineense and Xylopia aethiopica Seeds using Gas Chromatography Mass Spectrometry (GC-MS)

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ABSTRACT

A study of the bioactive components in the dichloromethane seed extracts of *Piper guineense* and *Xylopia aethiopica* was carried out using GC-MS analyses. *P. guineense* seeds revealed seventy-nine bioactive components with 1,3-Benzodioxole,4-methoxy-6-(2-propenyl)- as most predominant with a concentration of 50.374%, while *X. aethiopica* seeds had one-hundred bioactive components with 1H-Cycloprop[e]azulene,1a,2,3,4,4a,5,6,7b-octahydro-1,1,4,7 tetramethyl,[1aR(1a.alpha.,4.alpha.,4a.beta.,7b.alpha.)] 0as the most predominant with a concentration of 10.819%.These bioactive components observed from the plant species may have pharmaceutical properties that could be beneficial to humans.

NSBMB/UPH/NB/032

Phytochemical and In vitro Antibacterial Studies of Methanolic extract from *A. macrostachya Reichenb*. (*Leguminosae)* Leaves Extracts

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ABSTRACT

Acacia macrostahya Reichenb ex DC (*Fabaceae*) is used in traditional medicine for the treatment of many pathogens including diarrhea, malaria with convulsion and fevers, snake bites, vomiting, nausea, dysenteric syndrome and cholerifomis, inflammatory diseases and old wounds. One kilogram (1kg) of the powdered leave sample was successively extracted with 5 liters of methanol. The solvents were evaporated at 45^{o}C with the aid of rotary evaporator. The phytochemical screening was carried out using standard procedure for phytochemical analysis. The antibacterial studies was investigate using Agar well diffusion and Broth dilution method using different extracts concentrations of 0.2µg/ml, 0.1µg/ml, 0.05µg/ml and 0.025µg/ml respective. The extract yield was found to be 131.72g (13.17%) for methanol. The phytochemical screening reveals the presence of alkaloids, glycoside, steroids, tannins, flavonoids, polyphenol, coumarins and carbohydrate as well as Saponins are present in methanol extract. The antibacterial test shows the inhibitory effect against *Salmonella typhi*, *Shigella dysentarea*, *Escherichia coli* and *Pseudomonas aeruginosa*. The extracts shows MBC at 0.2µg/ml for *Shigella dysentarea, Escherichia coli, Pseudomonas aeruginosa with the exception of Salmonella typhi.* The plant *A. macrostachya* leaves have antimicrobial activity hence it is good to be used as medicinal plant for the benefit of mankind.

Keywords: Phyotochemical, antibacterial, *Acacia macrostachya*, methanol

NSBMB/UPH/NB/033

Phytochemical Analysis, Mineral Composition and In -Vitro Antioxidant Activity of Ethyl Acetate Extract of *Jatropha Tanjorensis* (Hospital Too Far) Leaves

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ABSTRACT

Jatropha tanjorensis is a medicinal plant that has been used for various purposes in traditional medicine. However, the phytochemicals, minerals, and antioxidant activities of its ethyl acetate extract have not been studied before. In this study, we aimed to determine these parameters using various analytical methods. Qualitative and quantitative phytochemical analysis were carried out, atomic absorption spectroscopy (AAS) and flame photometry was used to determine the mineral content of the ethyl acetate extract of the leaves. The in vitro antioxidant activity was determined using 2,2-diphenyl-1-picrylhydrazyl (DPPH) and ferric reducing antioxidant power (FRAP) assays. The results showed that the extract contained saponins, tannins, alkaloids, flavonoids, and anthraquinones, with high amounts of tannins and saponins. The extract also contains high levels of sodium, phosphorus, calcium, and magnesium, with a trace amount of zinc. The extract exhibited high antioxidant activity in both DPPH and FRAP assays, with a low IC_{50} value of 0.003 mg/ml. These findings suggest that the ethyl acetate extract of *Jatropha tanjorensis* leaves has a notable phytochemical and mineral composition, as well as a remarkable antioxidant activity, which may have potential applications in pharmaceutical and nutritional fields.

Keywords: *Jatropha tanjorensis*, phytochemicals, minerals, antioxidants activities, ethyl acetate extract

NSBMB/UPH/NB/034

Solvent-Partitioned Extracts of Cyathula Prostrata Leaf Extract Prevent Olanzapine-Induced Obesity in Rats

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ABSTRACT

In Nigeria, *Cyathula prostrata* leaves (CPL) is consumed to achieve weight loss. In this study, effect of solvent-partitioned extracts of CPL extract (CPLE) on olanzapine-induced obesity in rats was investigated. N- hexane, ethyl acetate, acetone and n-butanol were used for partitioning of CPLE. Rats were pre-treated with 3.1-28.0 mg/kg bw solvent-partitioned extracts (SPE) and orlistat (5 mg/kg bw) followed by administration of olanzapine (8 mg/kg bw) one hour after. All the administration was done for 28 days. Rats with body mass index (BMI) > 0.5 g/cm^2 were considered obese. Influence of SPE on BMI, lipid profiles, oxidative and enzyme markers were evaluated. Anthropometric data showed that SPE significantly ($p < 0.05$) induced weight loss and attenuated BMI, when compared to non-treated olanzapine-

induced obese rats. Biochemical analyses also revealed reduction in the serum level of LDL, total cholesterol and triglycerides in SPE-treated groups. In the heart and liver tissues, concentration of malondialdehyde and glutathione were decreased, while the activities of antioxidant enzymes (superoxide dismutase, catalase, glutathione reductase and peroxidase), alkaline phosphatase, alanine and aspartate aminotransferase were stimulated following administration of SPE to the obese rats. Increased in the activities of lipase and creatine kinase were also observed with the most profound effect in group administered 28 mg/kg bw of ethyl acetate extract. Findings from this study corroborated with indigenous knowledge and use of extracts from CPL in the management of obesity. The study concluded that the anti-obesity constituents of CPL can best be extracted with ethyl acetate.

Keywords: *Cyathula prostrata,* ethyl acetate, enzyme markers, lipid profiles, olanzapine.

NSBMB/UPH/NB/035

Anti-obesity effect of *Coula edulis* Nut Extract in High-Fat Diet-Induced Obesity: Evaluation of Anthropometric, Lipid Metabolism and Oxidative Stress Indicators, and Adipose Tissue Histology

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ABSTRACT

The study evaluated the body weight-reduction action of *Coula edulis* Balli nut extract (CEE) in high fat diet (HFD) obese rats, given that the nuts traditionally eaten as a weight control snack. Thirty rats comprised of one normal control (NC) and four HFD obese groups were used for the study. The NC and obese control (OC) received tap water and normal rat chow throughout the 6-week treatment period, while the remainder three groups received 0.3 g/kg Orlistat, and 1000 mg and 2000 mg/kg b.w., *p.o.* respectively. At the end of the study, anthropometric, biochemical indicators of obesity and histology of adipose and liver were evaluated. The results showed dose-dependent 72.9 % and 92.2 % reduction in body weight gained caused by 1g/kg and 2g/kg of CEE respectively vs OC ($p < 0.05$). Also, abdominal circumference, Lee's index, BMI and weights of adipose and organs reduced correspondingly ($p < 0.05$). Serum indicators including pancreatic lipase activity, cardiovascular risk indicators (atherogenic index, atherogenic coefficient and cardiac risk ratio) and lipid profiles were appropriately modulated relative to OC. Moreover, HMG-CoA reductase activity, stored lipids (total lipids in the heart, liver, adipose) and lipid peroxidation radical (TBARS-MDA), were lowered, while activities of antioxidant enzymes in adipose & liver (SOD, GPx and GSH) were

significantly elevated ($p < 0.05$). Histology of the adipose & liver corroborated biochemical data, indicating anti-obesity effect. Overall, the study validated body weight reduction action of *Coula edulis* nut, hence a veritable material for anti-obesity drug sourcing.

Keywords: Obesity, *Coula edulis* nuts, anthropometric indicators, oxidative stress indices & HMG-CoA reductase activity.

NSBMB/UPH/NB/036

Certain Foaming Characteristics of Crude Saponins of Seeds of *Balanites aegyptiaca* del

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ABSTRACT

In this studies, the foaming potentials of saponins from seeds of *Balanites aegyptiaca* was assessed through their foam heights of the crude saponins extract were compared with commercially available detergents including Tween 80 and Triton-X-100 at varying concentrations of 0.2%, 0.4%,0.5%,0.6%,0.8% and 1.0% respectively. The foam heights of the various extracts were compared using statistical analysis (ANOVA) for their differences at 0 min, 1min, 5 min and T(hr). Crude saponins extract as well as Tween 80 and Triton-X-100 solutions ($p>0.05$) were not significantly different. The crude saponins extract formed foam with the highest height of 3.35 ±0.13(cm) at 1.0% concentration of initial time and foaming time of 4.68 ± 0.32.68 (hr). It was observed that the crude saponins extract had a significant foam power and foam stability when compared with the other extracts and was regarded as metastable at 0.5%. Foam power of the crude saponins extract solution of the seeds was 19.2% of 0.5% Triton-X-100 solution and foam power of 0.5% of crude saponins extract solution was 28.8% of 0.5% Tween 80 solution.

Keywords: Saponins, *Balanites aegyptiaca* del., Foam power, Foam stability, Foam Height.

NSBMB/UPH/NB/037

Antioxidant Potentials of *Hyphaene thebaica* Fruit Mesocarp as a Nutraceutical Agent in the Management of Oxidative Stress

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ABSTRACT

Oxidative stress is an imbalance between the production and scavenging of reactive oxygen species (ROS) and reactive nitrogen species (RNS) as well as other free radicals that can induce lipid peroxidation, DNA fragmentation and protein oxidation. These damages result in the loss of membrane integrity, structural and functional changes in proteins and gene mutations. Hence, this study was aimed at evaluating the potentials of *Hyphaene thebaica* fruit mesocarp that can be considered as a nutraceutical agent in the management of oxidative stress. *H. thebaica* fruits were collected within Sokoto metropolis. They were duly authenticated in the Department of Plant Science and Biotechnology, Kebbi State University of Science and Technology, Aliero, Nigeria. Wistar Albino rats were used for the *in vivo* antioxidant activity screening. They were purchase from the Department of Biochemistry, Usmanu Danfodiyo University, Sokoto, Nigeria. Phenolic, flavonoid, some micronutrients as well as proximate composition of the fruits were determined using standard procedures. *In vitro* antioxidant activity was assessed using DPPH and FRAP assays. While, CCl_4 was used to induce the oxidative stress for the *in vivo* antioxidant activity screening of the *H. thebaica* fruit. Vitamins C and E were used as standards. At the end of the experimental period, blood samples and hepatic tissues were collected from each rat, then sera and hepatic tissue homogenates were prepared. Activities of catalase (CAT), superoxide dismutase (SOD), glutathione peroxidase (GPx) and malondialdehyde (MDA) level were assessed. The results revealed that, the phenolic and flavonoid content of the *H. thebaica* fruit was 0.62±0.062µmol/l and 7.03±0.024g/% respectively. The levels of the antioxidant micronutrients; Vitamin A, C, E, Cu, Mn, Se and Zn were found to be 2.75±0.38mg/%, 160.93±0.81mg/l, 121.80±0.29mg/dl, 11.25±1.25mg/g, 22.50±0.35mg/g, 10.00±0.88mg/g and 11.25±1.25mg/g respectively, while the proximate composition of the fruit revealed that, the content of carbohydrate, protein, lipid, ash, fiber and moisture was 79.20±3.920, 5.10±0.230, 1.70±0.003, 5.65±0.007, 5.13±0.140 and 9.70±0.004 g/% respectively. The *in vitro* antioxidant activity of the fruit extract was observed to be 63.69±0.06% and 83.95±0.49% using the DPPH and FRAP assay respectively compared with that of vitamin C (160.93±0.81 mg/l) and vitamin E (121.80±0.29 mg/dl). It was observed that, 20% CCl_4 (in olive oil) significantly decreased the activities of CAT, SOD and GPx and increased the level of MDA in the serum and hepatic homogenates when compared with the normal control rats. However, treating the oxidatively stressed rats with the graded doses of *H. thebaica* mesocarp extract had significantly ($p<0.05$) increased the activities of the enzymes and reduced the concentration of MDA when compared with untreated (negative control) group. Based on the findings, it was concluded that the *H. thebaica* mesocarp fruit has antioxidant properties and potentialities that qualifies it to be considered as a nutraceutical agent in the management of oxidative stress.

Keywords: *Hyphaene thebaica* fruit, Oxidative stress, Antioxidant, Proximate composition, Micronutrients, Phenols, Flavonoids.

NSBMB/UPH/NB/038

Anti-microbial and Anti-oxidant Properties of the Leaves and Seeds of *Datura stramonium*

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ABSTRACT

The antimicrobial potential of *Datura stramonium* leaves and seeds extracts was screened against two pathogenic microorganisms (*Staphylococcus aureus* and *Escherichia Coli*). The extracts of the leaves and seeds of the plant was gotten using 5 different solvents (Methanol, Hexane, Ethanol, Chloroform and Ethyl acetate) and were subjected to a test of their antimicrobial properties by agar well diffusion method. The result indicated that some of the extracts exhibited antimicrobial properties. The highest potential was observed in the ethyl acetate leaf extract of *Datura stramonium* and the hexanoic seed extract of *Datura stramonium* against *Staphylococcus aureus* and *Escherichia Coli* with zone of inhibition (ZOI) of 26mm and 24mm respectively. The experiment confirmed the efficacy of *Datura stramonium* leaf and seed extracts as natural antimicrobials and suggested the possibility of employing them in drugs for the treatment of infectious diseases caused by the test organisms. The leaves and seed extract of *Datura stramonium* were also screened for their free radical scavenging properties using ascorbic acid (vitamin C) as standard antioxidant. Free radical scavenging activity was evaluated using 1,1-diphenyl-2-picryl hydrazyl (DPPH) free radical. *Datura stramonium* exhibited high antioxidant activity. The present study reveals that the leaves and seeds *Datura Stramonium* exert several beneficial effects by virtue of their antioxidant activity and could be harnessed as drug formulation.

Keywords: *Datura stramonium*, antioxidant, antimicrobial, Free radicals, microorganisms.

NSBMB/UPH/NB/039

*Proximate Analyses, In vitro antioxidant activity an*d GC-MS Analyses of Fermented *Pentaclethra Macrophylla* Seeds

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ABSTRACT

The study aimed to investigate the proximate composition, *in vitro* antioxidant activity and GC-MS analyses of fermented *Pentaclethra macrophyllla* seeds extract (FPMSE). 2,2-diphenyl-1-picrylhydrazl (DPPH) was used to assess the *in vitro* antioxidant activity while Gas Chromatography-Mass Spectrophotometer (GC-MS) technique was used to identify the volatile compounds in FPMSE. FPMSE revealed a dose dependent percentage inhibition of the extract on DPPH assay. Proximate composition of FPMSE constitutes respectively; ash (0.33 ± 0.12%), protein (2.19 ± 0.08%), fats and oil (80.60 ± 0.00%), carbohydrate (16.88 ± 0.00%) while moisture and fibre were not detected. However, the pulverised sample constitute respectively; ash (1.27 ± 0.58%), protein (10.51 ± 0.60%), moisture (8.27 ± 0.12%), fats and oil (32.33 ± 0.12%), fibre (7.27 ± 0.12%) and carbohydrate (40.35 ± 0.00%). GC-MS analyses revealed fourteen (14) fatty acids including Octadecanoic acid (1.95%), Benzyloxymethylimine (43.89%), 2-Allylpent-4-enoic acid benzyl ester (26.25%), Hexadecanoic acid, methyl ester (1.09%), Oleic Acid (0.25%), 9,12-Octadecadienoic acid, methyl ester (Omega-6-fatty acid) (1.52%). The bioactive compounds identified may be responsible for any of the pharmacological properties of *Pentaclethra Macrophylla* seeds and hence, could be of considerable interest for the development of new drug leads.
Keywords: *Pentaclethra macrophylla, in vitro antioxidant, GC-MS, fatty acids*

NSBMB/UPH/NB/040

Effect of boiling on the phytochemical and polyphenolic profiles of pumpkin (*Cucurbita pepo*) rind and leaves

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ABSTRACT

The effect of boiling on the phytochemical and polyphenolic profiles of pumpkin (*Cucurbita pepo*) rind and leaves was investigated using standard techniques. Boiling significantly increased ($p<0.05$) the tannins, alkaloids and trypsin inhibitor; significantly decreased ($p<0.05$)

the saponins while it had no significant effect ($p>0.05$) on the phytate contents of the rind compared to the raw rind. In terms of the leaves, boiling significantly increased ($p<0.05$) their tannins, alkaloids, phytates and trypsin inhibitor while it significantly decreased ($p<0.05$) their saponin contents compared to the raw leaves. Further, boiling increased the syringic acid concentrations of the rind and leaves compared to raw rind and leaves. In addition, boiling increased the gallic acid contents of the rind, diminished p-coumaric acid contents of the rind and leaves while it enhanced the extractability of luteolin in the leaves. Current study suggests that our boiling technique helped to preserve the phytochemicals and polyphenolic profiles of *Cucurbita pepo*.

Keywords: Phytochemical, Boiling, *Cucurbita pepo*, polyphenolic compounds

NSBMB/UPH/NB/041

Effect of boiling on the proximate, amino acid, macro and micro mineral composition of pumpkin (*Cucurbita pepo*) rind and leaves

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ABSTRACT

The effect of boiling on the proximate, amino acid, macro and micro mineral composition of pumpkin (*Cucurbita pepo*) rind and leaves was investigated using standard techniques. Boiling significantly increased ($p<0.05$) the moisture content, total carbohydrate and energy value of the rind compared to the raw but significantly decreased ($p<0.05$) the ash content, total proteins, fat and crude fiber content of the rind compared to the raw rind. In terms of the leaves, boiling significantly increased ($p<0.05$) their moisture, total proteins and energy values; significantly decreased ($p<0.05$) their ash, crude fiber and total carbohydrates while it had no significant effect ($p>0.05$) on their fat contents. Boiling also significantly decreased ($p<0.05$) the total amino acid contents of the rind while it significantly increased ($p<0.05$) the total amino acid contents of the leaves compared to the raw. Boiling also led to greater loss of minerals in the rind than in the leaves. Current study revealed that boiling retained the nutrient contents of the leaves better than the rind.

Keywords: Proximate, Boiling, *Cucurbita pepo*, Amino acid, Mineral

NSBMB/UPH/NB/042

Assessment of Antioxidant Enzymes Activity and Vitamins Levels in Indomethacin-Induced Ulcer Albino Rats Treated With Unripe *Musa Acuminata*

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ABSTRACT

Ulcer is a common gastrointestinal disease affecting worldwide population. Many synthetic drugs were available for ulcer treatment. However, nowadays search for medicinal plants with anti-ulcer activity has been increased due to their negligible side effects compared to synthetic drugs. Unripe *Musa acuminata* was claimed to be used traditionally for treatment of ulcer. This study aimed to evaluate the antioxidant enzymes activity and vitamins levels in indomethacin-induced ulcer albino rats. The ulcer was induced using indomethacin model. The antioxidant activity was evaluated by measuring the activities of catalase, superoxide dismutase, glutathione peroxidase, malondialdehyde, as well as vitamins A, C and E. The result revealed that glutathione peroxidase activity increased significantly ($P<0.05$) in 50mg/kg bwt extract treated group compared to the induced non-treated group. However, there was no significant ($P>0.05$) difference in both the standard drug control and 150mg/kg bwt extract treated group when compared with induced non-treated group. Similarly, the result revealed a significant ($P<0.05$) increased in catalase and superoxide dismutase activities in both standard drug treated and all the extract treated groups compared to both induced non-treated and normal control groups. In contrast, malondialdehyde activity revealed a significant ($P<0.05$) decreased in both standard drug treated and all the extract treated groups when compared to induced non-treated group, as well as the normal control group. Moreover, the result revealed that vitamins A and E significantly ($P<0.05$) increased in both standard drug treated and all the extract treated groups compared to normal control. However, the result reveled a significant ($P<0.05$) decreased in vitamin C concentration, in both standard drug treated and extract treated groups when compared with both normal control and induced non-treated groups. Therefore, in conclusion unripe *Musa acuminata* possesses significant antioxidant potential which might be attributed to its anti-ulcer effect.

Keywords: Antioxidant, Indomethacin, *Musa acuminata*, Enzymes

NSBMB/UPH/NB/043

Modulating Starch Digestibility in Achieving Glycemic Control

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ABSTRACT

Starch digestibility has been observed to be an important indicator of glycemic and insulin response of foods. Starch digestibility can be affected by processing methods such as the degree of gelatinization. This study examines the effect of degree of gelatinization on starch digestibility as measure of regulating glycemic and insulin responses *in* vivo. Two commonly consumed foods (*Usi and Okpa*) in southern part of Nigeria were investigated for their rapidly digestible starch (RDS), slowly digestible starch (SDS) and resistant starch (RS) content at varying degrees of gelatinization. Gelatinization time and temperature with low RDS concentrations served as control in the preparation of foods administered to twenty subjects. Varying degrees of gelatinization of starch did not significantly ($P<0.05$) alter the glycemic index or insulin index of *Usi*, however only the glycemic index of Okpa was significantly ($P< 0.05$) lowered.This data suggests that the degree gelatinization is not a main determinant of the high glycemic index of *Usi.*

Keywords: Gelatinization, glycemic index, starch digestibility

NSBMB/UPH/NB/044

Phytochemical Screening and Antiproliferative Potential of Some Medicinal Plants in Northeastern Nigeria

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ABSTRACT

The use of medicinal plants for the therapy of different disease conditions has been in practice for decades, this has been attributed to the various phytoconstituents present in plants. This study seeks to investigate the presence of secondary metabolites and assess the growth

inhibitory properties of some plant extracts. The method used to assess the growth inhibitory potential of the extracts involved the incubation of viable *Sorghum bicolor* seed in different concentrations of the extracts and water as a control. The seeds radicle lengths were measured at different time intervals to ascertain the antiproliferative activity of the extracts. The results showed the presence of alkaloids, coumarins, flavonoids, phenolics, steroids, terpenoids, tannins, saponins, quinone, anthraquinone and glycosides. The antiproliferative potential of the plants was evident by the concentration dependent decrease in the growth of the seeds in the different extracts. This suggests that when explored further; extracts from the different plants might be used as an anticancer agent.

Keywords: Antiproliferative, phytoconstituents, sorghum bicolor seed, inhibition, cancer

NSBMB/UPH/NB/045

Effect of Tropical Almond Seed and Carrot Flour Addition on Growth and Hematological Parameters of Albino Rats Fed With Sorghum Agidi

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ABSTRACT

This research work determines the protein quality index and hematological parameters of rats fed with sorghum based *agidi* enriched with carrot, defatted and non-defatted tropical almond seed flour. Bioassay of *agidi* was determined using 35 weanling albino rats (Sprague-Dawley strain). Total hematological analysis was done using Abacus 20 autohemo-analyzer. Data were statistically analyzed with one way Analysis of Variance (ANOVA). All the 35 rats used survived until the end of the study and gained positive weights except rats fed on basal diet (ANC) and the non-enriched sorghum *agidi* (AA and AAC). Rat fed with tropical almond enriched diet (AACU and AACD) experienced significant gained in their body weight (23.37g and 25.72g). Protein efficiency ratio data for rats fed with feed enriched with defatted tropical almond seed flour (AACD) is the highest (2.53). Rat fed with casein enriched diet (APC) had the highest apparent digestibility (86.21%). The rats fed with AACU and AACD had WBC values of 6.95 x 10^9/L and 11.47±0.31 x 10^9/L, RBC values of 5.29 x 10^{12}/L and 4.80 x 10^{12}/L while rats fed with AA and AAC had WBC values of 42.03 x 10^9/L and 34.29 x 10^9/L, RBC values of 2.54 x 10^{12}/L and 4.62 x 10^{12}/L respectively. The MPV and P-LCR of all the rats tested were within their normal ranges of 8.30-12.10 and 25.30-53.80 respectively. The Hgb of rats fed with AACU and AACD were significantly higher *($p<0.05$)* than rats fed with AA and AAC. This study established that protein from tropical almond seed flour supports the growth of albino rats and significantly improved the hematological properties of the rats.

NSBMB/UPH/NB/046

Physicochemical, Bioactive, Antioxidant, Antidiabetic and Sensory Properties of Yoghurt Supplemented With *Curculigo Pilosa* and *Mucuna puriens*

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ABSTRACT

Yoghurt is a prominent diary product that is well consumed globally. In the present study, physicochemical (pH and titratable acidity), bioactive (phenolics and flavonoids), antioxidant (ABTS, DPPH, FRAP and TAC) and antidiabetic (inhibition of α-amylase and α-glucosidase) potentials of *Curculigo pilosa* (CP) and *Mucuna puriens* (MP) supplemented yoghurts stored at cold temperature (4 ^{o}C) was evaluated at days 0, 7 and 14. Sensory study was also conducted at days 0, 7 and 14. The results showed that inclusion of CP and MP significantly decreased post acidification of the yoghurts during storage; CP (3.37 %) and MP (2.59 %) when compared with control (5.29 %). Phenolics and flavonoids contents of the yoghurts were significantly increased upon supplementation with CP and MP throughout storage periods. Antioxidant activity and capacity to inhibit α-amylase and α-glucosidase of yoghurt were significantly enhanced upon addition of CP and MP throughout storage periods. There was reduction in consumer's sensory acceptance of the CP- supplemented and MP- supplemented yoghurts when compared with control yoghurt. Taste of the supplemented yoghurts was mostly affected. In conclusion, supplementation of yoghurt with CP or MP positively impacted the physicochemical, bioactive, antioxidant and antidiabetic potentials of yoghurt. Despite the reduction in consumers' sensory scores for CP- and MP- supplemented yoghurts, their scores still fall within acceptable range. Therefore, inclusion of *Curculigo pilosa* and *Mucuna puriens* should be encouraged in making of yoghurt to enhance nutraceutical value.

Keywords: Antioxidant, *Curculigo pilosa*, *Mucuna puriens*, Supplementation, Yoghurt

NSBMB/UPH/NB/047

Comparative Study on the Antidiabetic Activity of Fresh and Fermented Fruit Juice of *Morinda Citrifolia* in Alloxan-Induced Diabetic Rats

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ABSTRACT

The fresh and fermented fruit juice of *Morinda citrifolia* has antidiabetic activity. This study compared the antidiabetic activity of the fresh and fermented fruit juice of *Morinda citrifolia*. Forty-five wistar rats were randomly divided into 9 groups. Group 1 was the normal control. Groups 2 – 9 was induced with diabetes using alloxan. Group 3 was administered standard drug, glibenclamide. Groups 4.5.6 were administered 20, 40 and 80 mL/kg. b. wt. fresh fruit juice of *M. citrifolia* respectively, while groups 7, 8 and 9 were administered 20, 40 and 80 mL/kg. b. wt. fermented fruit juice of *M. citrifolia* respectively. The fasting blood glucose (FBG) level of the rats was taken at an interval of two days. The initial and final weight of the rats were taken. After sacrificing the animals on the 15th day, the concentration of albumin, ALT, AST and ALP was determined using standard methods. The FBG level of the groups administered 80 mL/kg. b. wt. fresh fruit juice and 80 mL/kg. b. wt. fermented fruit juice of *M. citrifolia* was comparable with the control by day 7. The weight gain of the diabetic rats that received 80 mL/kg. b. wt. fresh and fermented fruit juice of *M. citrifolia* was not significantly different from each other. The serum liver indices of rats administered 80 mL/kg. b. wt. fermented fruit juice of *M. citrifolia* was not significantly different from the control. Fermented fruit juice of *M.citrifolia* is more effective in treating liver damage caused by diabetes mellitus.

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Modulatory Effect of Dietary *Pentadiplandra brazzeana* Baill Root Supplemented Feed in Oedematous and Polyarthritic Rat

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ABSTRACT

Musculoskeletal disorders including osteoarthritis, rheumatoid arthritis and rheumatism are chronic inflammations linked with intense joint pain. *Pentadiplandra brazzeana* Baill root (Joy perfume tree) root is a dietary food used in traditional care to manage inflammatory disorders. Anti-inflammatory, antioxidant, and immunomodulatory effects of *P. brazzeana* root-supplemented feed (PBRF) against acute oedema and chronic polyarthritis were studied in Wistar rats. *Zingiber officinale* served as the standard. Plasma alanine aminotransferase (ALT), aspartate aminotransferase (AST), oxidative stress markers were investigated using standard methods. Nuclear factor kappa B (NF-κB), cyclooxygenase-2 (COX-2), and tumour necrosis factor-alpha (TNF-α) were determined using ELISA assays. Neutrophils, monocytes, basophils, eosinophils, procalcitonin, white blood cells, platelets, haemoglobin, red-blood cells, and lymphocytes, counts were assayed using autoanalyzer. The PBRF significantly *(p* <

0.05) suppressed rat paw thickness in carrageenan, complete Freund's adjuvant (CFA) and formaldehyde models. The activities of AST and ALT in formaldehyde-induced oedema model were significantly reduced by PBRF. Furthermore, PBRF significantly decreased COX-2 activity, TNF-α, NF-κB, and malondialdehyde concentrations, while reduced glutathione level, catalase, superoxide dismutase, and glutathione peroxidase activities, were significantly increased in the CFA-induced polyarthritis model. The PBRF-treated groups had low lymphocytes, basophils, white blood cells, monocytes, neutrophils, eosinophils, and procalcitonin counts, compared to the negative control diet group. The PBRF exhibited considerable anti-inflammatory, antioxidant and immunomodulatory curative effects against acute oedema and chronic polyarthritis in rats. The mechanistic action could be through, COX-2, TNF-α and NF-κB signaling pathways inhibition, boosting of the antioxidant defense system and modulation of immunological parameters.

***Keywords*:** antioxidant, immunomodulation, inflammation, oedema, *Pentadiplandra brazzeana*, polyarthritis, root supplement

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Comparative evaluation of the in-vitro nutraceutical potentials of two vegetable crops- *Murraya koenigii* (Linn.) and (*Occimum grattissimum* L.) from River Benue valley, North central Nigeria.

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ABSTRACT

Plant materials over the ages have been serving mankind for food and medicine respectively. Researches have also shown that more than 70 % of the pharmaceutical raw materials are obtained from plants and other essential nutrients required by crops to thrive. Alluvial soil is the soil type that are deposited by flowing waters on the shores of rivers. Soil studies showed that it is rich in in minerals and other essential nutrients required by crops to thrive. *Murraya koenigii* and *Occimum gratissimum* are tropical crops that require good amount of rainfall and sunshine for them to thrive and produce. They are together native of India and West Africa respectively. These two crops have demonstrated that their leaves, roots and bark of these plants are rich sources of carbazole alkaloids which produce potent biological activities, nutritional potentials, and pharmaceutical effects. These include anti-oxidant, anti-diabetic, anti-inflammatory, anti-tumour, anti-hypertensive, hepato-protective, neuro-protective, anti-microbial, and anti-thrombic properties. In India, *M. koenigii* is used as a medicinally important herb in the native Ayurvedic medicine. Also, *O, gratissimum* parts are used in Nigeria for virtually all the above properties. This research showed that soil nutrients availability to the

above two crops is directly proportional to the bioactive compounds bioavailability as well as directly proportional to the soil type on which these two crops are grown. Hence, alluvial soil is the best soil for maximal growth and productivity of *M. koenigii* and *O.gratissimum* respectively. The above was extrapolated after comparing the two plants grown on different types of soils with respect to their nutrients contents.

Keywords: Vegetables, Alluvial soil, Phytochemicals, Bioavailability, Nutrients

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Analysis of Antioxidant Vitamins and Mineral Contents in Wheat and Brown Rice: A Comparative Study

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ABSTRACT

Wheat and brown rice are fundamental staple grains in global diets, rich in essential nutrients. This study aimed to analyze the antioxidant vitamin contents of wheat and brown rice, crucial for health promotion and disease prevention. The investigation focused determining the levels of Vitamins A, C, and E, through validated analytical methods along with minerals assessed using atomic absorption spectroscopy. The findings revealed wheat's nutritional superiority over brown rice in terms of antioxidant vitamins, exhibiting significantly ($p<0.05$) higher levels of vitamin A (0.82±0.02 vs 0.06±0.00 mg/100 g), C (4.31±0.10 vs 0.00 mg/100g), and E (0.62±0.00 vs 0.04±0.00 mg/100g). Moreover, wheat displayed elevated iron, zinc, and manganese levels compared to brown rice, while brown rice exhibited a higher copper content. This study underscores wheat's nutritional advantages in providing antioxidant micronutrients over brown rice, emphasizing the importance of incorporating whole grains into dietary recommendations for optimal antioxidant intake.

Keywords: Wheat, Staple grain, Brown rice, antioxidant micronutrients.

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Effects of *Canarium schweifurthii* Fortification on Growth Performance in Male Albino Rat

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ABSTRACT

Feed is the most important factor linked to livestock production. Scholarly investigations in the field of animal nutrition is always concerned with identification of obstacles that hinder an efficient digestion and utilization of nutrients as well as development of strategy to enhance feed quality. This study was aimed at evaluating a growth parameter associated with fortification of normal diet with *Canarium schweifurthii Cake.* Twenty (20) male Albino rats were fed ad libitum in 28-day trial experiment to determine the effect of different levels of fortification of *Canarium schweinfurthii Cake* on growth performance. The rats were distributed into five (5) treatment groups of four (4) replicates each of which group one (1) serves as a control group. The proximate composition of *Canarium schweinfurthii Cake,* lethal dose (LD_{50}), feed intake/weekly weight gain, feed efficiency ratio and investigation of total serum protein and serum lipid profile were determined. The results indicated a significant increase in body weight with increase in feed intake ($p>0.05$) among the treatment levels compared to the control. The proximate composition revealed high level of crude fat, while investigation with the Rats serum reveals a significant ($p>0.05$) increase in HDL and decrease in LDL-cholesterol levels between 7.5% and 10% treatment groups and the control

Keywords: *Canarium schweifurthii Cake*, Fortification, Feed Quality, and Growth Performance.

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A Review on Food Poisoning

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ABSTRACT

Food poisoning also known as a foodborne illness is caused by the consumption of contaminated food or water containing various bacteria, viruses, protozoa, non-microbial agents of vegetable or animal origin, and also toxins of biochemical or chemical nature. The primary source of foodborne illness is bacteria (66%), chemicals (26%), parasites (4%), and viruses (4%). In recent times more people have died from diarrheal diseases caused by consumption of contaminated food and water. The symptoms of food poisoning are headache, giddiness, colicky pain, cold and clammy skin, intense thirst, acute vomiting, diarrhea, slow pulse, rigors, abdominal pain, hepatic, and cramps. Food poisoning can be avoided through consumption of healthy food, fresh vegetables, fresh fruits and purified water. Thus, this review introduces the hazards of foodborne pathogens, risk analysis methods and control measures. Recent research progress and solutions regarding the use of electrochemical biosensors to

detect foodborne pathogens in food is also discussed. Removal of viruses that are present on water or it's surfaces using an ultraviolet light is also highlighted.

Keywords: Food, Poisoning, Electrochemical, Biosensors, and Ultraviolet.

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Phytochemical Composition and Antioxidant Activity of Hot Water Extract of Lipton and 28-Days Detox Slim Tea

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ABSTRACT

The consumption of tea, especially herbal tea (HT), has been associated with reduced occurrence of oxidative process with all the associated medical consequences. This study was undertaken to evaluate the phytochemical constituents and *in-vitro* antioxidant activity of hot water extracts of Lipton tea and 28-days detox slim tea. The analyses were done using standard biochemical methods. The antioxidant activity was evaluated using free radical scavenging (DPPH- 2, 2 diphenyl-1-picrylhydrazyl), inhibition of lipid peroxidation and reducing power ability assays. BHA (buthylated hydroxyanisole) was used as the standard. From the result of the phytochemical analysis, Phenol (12.05±0.78; 5.60±0.28 mgGAE/g), Flavonoid (2.22±0.14; 1.04±0.06 mgCE/g), Tanin (8.64±0.04; 5.05±0.21 mgTAE/g), Oxalate (4.29±0.39; 3.99±0.15 mg/g), Alkaloid (1.12±0.46; 1.11±0.13 %) and Phytate (0.82±0.02; 0.46±0.08 mg/g) were found in Lipton and 28-days detox slim teas respectively. Saponin (0.19±0.01%) was found only in Lipton tea. The antioxidant activity of the teas was concentration-dependent. Lipton tea was more potent than 28-days detox slim tea in all the assays. The EC_{50} values for DPPH assay were 537.28, 866.16 and 1165.19 µg/ml, the IC_{50} values for inhibition of lipid peroxidation assay were 517.85, 751.24 and 1087.09 µg/ml while the $O.D_{0.5}$ for reducing power assay were 321.42, 419.5 and 552.56 µg/ml for BHA, Lipton and 28-day detox slim teas respectively. The presence of these phytochemicals shows that Lipton tea and 28-days detox slim tea may be pharmacologically beneficial but should be taken with caution due to the presence of Oxalate and Phytate which are anti-nutrients. The antioxidant activity shows that the teas can be used in prevention and management of degenerative diseases arising from oxidative stress.

Keywords: Tea, Lipton, Detox, Slim, Antioxidant, Phytochemical

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Chemical Compositions of Unripe *Azanza garckeana* Seeds

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ABSTRACT

Background: In the dry and semi-arid areas of Africa, *Azanza garckeana* is one of the least-used indigenous wild fruit trees of interest. Due to its fruit's extensive nutritional and functional components, it has found relevance as food, and its bark and leaves, as medicine. In this study, the nutritional and anti-nutritional makeup of the unripened seeds was investigated. **Materials and methods**: Following standard procedures, analyses of proximate, vitamins, minerals, and anti-nutrients were performed. **Results**: In the ground-up, unripened seeds of *Azanza garckeana*, mineral analysis revealed the presence of phosphorus (86.20±0.28mg/100g), calcium (13.33±0.00mg/100g), potassium (14.69±0.87mg/100g), sodium (5.26±0.03mg/100g), zinc (0.04±0.00mg/100g), and iron (0.36±0.00mg/100g). Vitamin A (69.00±0.28mg/100g), B1 (1.18± 0.02mg/100g), B2 (1.10±0.00mg/100g), C (35.40±0.28mg/100g), D (178.60±5.35mg/100g), E (2.75±0.01mg/100g), and K (7.49±0.25mg/100g) were all detected in *Azanza garckeana*. The sample's crude fiber content was found to be 22.7±0.07%, crude fat content to be 1.77±0.03%, moisture content to be 7.62±0.01%, ash content to be 3.48±0.03%, crude protein to be 18.60±0.02%, and carbohydrate to be 45.83±0.00%, according to proximate analysis. However, anti-nutrients such oxalate, phytate, and hemagglutinins were discovered in these ripe *Azanza garckeana* seeds. The results showed that these seeds contained 1.84±0.02 mg/100g, 0.79± 0.01 mg/100g, and 106.20±0.56 HU/mg, respectively, of these anti-nutrients. **Conclusion**: These results support not just the use of unripe *Azanza garckeana* seeds for the development of food products with added value, but also their incorporation into farming systems to improve nutritional security and generate immediate cash for populations in sub-Saharan Africa's dry regions.

Keywords: proximate; minerals; vitamins; antinutrients

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Evaluation of the Nutritional Potential of Ethanol Extract *Pachira glabra* Leaves

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ABSTRACT

This research work evaluated the nutritional potential of ethanol extract of *Pachira glabra* leaves. Fresh leaves of *Pachira glabra* were collected from a farm at Umuowa in Ngor Okpala Local Government Area of Imo State, Nigeria. The leaves were authenticated at the herbarium department in the Department of Plant Science and Biotechnology, University of Port Harcourt, Rivers State, Nigeria. The leaves were washed, and air-dried for two weeks in the laboratory. The dried leaves were milled into powder and used for the analysis. The proximate, phytochemicals, and minerals were analyzed using standard methods. The qualitative and quantitative phytochemical findings showed the presence of saponins (32.82±0.11mg/100g), phytate (10.26±1.01mg/100g), alkaloids (15.53±0.34mg/100g), tannins (22.98±0.26mg/100g), phytate (10.26±1.01mg/100g), steroids (22.91±0.43mg/100g), phenols (26.01±0.41mg/100g) and flavonoids (56.37+0.06mg/100g). Among different phytochemicals analyzed, flavonoids was found to have the highest concentration (56.37±0.06mg/100g). The phytochemical with the lowest concentration was phytate (10.26±1.01mg/100g). The leaves was analyzed for their proximate compositions and from the result, the highest was carbohydrate (48.73±0.34%). The nutrient with the lowest amount was fat (1.90±0.01%). The following minerals were analysed in the leaf: sodium, chlorides, calcium, potassium, iron, magnesium, phosphorus, and zinc. Among the minerals analyzed, chloride content was the highest (30.36±0.21mg/g) followed by calcium (23.34±0.45mg/g). The amount of iron was the least (1.06±0.22mg/g). The results shows that *Pachira glabra* leaves were found to possess significant amount of nutrients and phytochemicals suggesting its beneficial effect in enhancing metabolic processes via enzyme activation hence its ethno-medicinal potential.

Keywords: *Pachira glabra*, proximate composition, phytochemicals and minerals

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Phenolic and Alkaloid-Rich Extracts of *Persea americana* Seeds Restore Dyslipidemia and Systemic Homeostasis in HFD Obese Rats

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ABSTRACT

The study evaluated the effect of phenol- and alkaloid-rich extracts of *Persea americana* (Avocado) seeds on indicators of obesity in HFD-obese rats. Phenol- and alkaloid-rich extracts from the seeds were prepared using standard methods. The treatment plan consisted of 6 groups of 8 rats each, the first being normal control which received placebo treatment for the 6 weeks. The remainder five HFD-obese groups respectively received: 0.5% DMSO (obese control), 30

mg/kg Orlistat (standard control), 500 mg/kg each of phenolic- and alkaloid- extracts and 250mg/kg of the two combined, for 6 weeks. Thereafter, the animals were sacrificed and anthropometric and biochemical indicators of obesity studied. From the results, the extracts caused profound decreases in body weight gain, BMI and Lee's index ($p \leq 0.05$). Biochemical indicators including pancreatic lipase and HMG-CoA reductase activities, peroxidation radicals (TBARS-MDA) were lowered relative to the obese control ($p \leq 0.05$), whereas, antioxidant enzymes increased ($p \leq 0.05$). Tissues lipids (Total lipids, TG, Cholesterol and Phospholipids), and serum lipid profile were decreased with concomitant increase in HDL-c increased. Also, the extracts were found to exert protection on the liver and kidneys of the animals. Similarly, insulin resistance was improved via measured glucose, insulin and insulin resistance (HOMA-IR). Chemical profile analysis via GC-FID, GC-MS, FT-IR and HPLC revealed the presences of bio-actives and functional groups likely responsible for these reported activities. Therefore, Avocado seeds could be a plausible source for functional compounds or adjuncts for modulation of body weight gain.

Keywords: *Persea americana* seeds, high fat diet obesity, tissue and serum lipids, oxidative stress and HMG-CoA reductase

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Effects of the Mixture of Tiger Nuts (*Cyperus esculentus)* and Date palm (*Pheonix dactilfera*) Flour On the Reproductive Functions of Male Wistar Albino Rats.

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ABSTRACT

The use of synthetic drugs in the treatment of infertility has been shown to produce some adverse effects and it is quite expensive. The present study was undertaken to investigate the effect of the mixture of *Cyperus esculentus* (Tiger nuts) and *Pheonix dactilfera* (Date palm) flours on the reproductive profile of male Wistar rats. Thirty (30) male Wistar rats weighing between 70-120g were obtained from the Animal House of the Biochemistry Department, University of Port Harcourt, Choba, Rivers State Nigeria. Acclimatization was done for one week before experimentation. Water and rat feeds were provided ad libitum and the animals were kept under room temperature. The animals were grouped into six of five rats per group, Group one (1) the control was administered rat feed only, Group two (2) was given rat feed and Tiger nut flour only, Group Three (3) was given rat feed and Date palm flour only, Group four (4) was given rat feed, Tiger nut and Date flour mixture in ratio 1:1, Group five (5) was given rat feed and mixture of Tiger nut and Date flour in ratio 1:2 and Group Six (6) was given rat feed with a mixture of tiger nut and Date flour in ratio 2:1 for twenty-eight days. The animals were sacrificed under anesthesia (chloroform suffocation) and blood samples were collected through cardiac puncture into EDTA bottles. The testis was collected through ab-domino-thoracic dissection into plain bottles containing Bouin's fixatives for histological study. Part of

the testes were collected in plain bottles for sperm analysis. The result revealed a significant boost in sperm count, viability, and motility in all groups compared to the control. Group VI administered rat feed with a mixture of tiger nut and Date flour in a ratio of 2:1 showed a marked increase in testosterone (2.30nmol/L) level, also with a significant ($p \leq 0.05$) increase in FSH (2.31mIU/ML). Normal spermatocytes, seminiferous tubules, and spermatogonia of the group given the formulated diet were histologically shown to have no pathology in the Testes compared to the control. Tiger nuts flour when in combination with Dates flour increased the sperm count and quality more than when the two samples were used separately and has also proven to be safe for the Testes without posing any harm.

Keywords: Histopathology, Testosterone, Follicle Stimulating Hormone (FSH)

NSBMB/UPH/NB/058

Antidirrhoeal Potentials of Methanol Extract and Fractions of *Napoleonae imperialis* Leaves in Castor Oil-Induced Diarrhoea in Albino Rats

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ABSTRACT

This study evaluated the antidiarrhoeal potentials of methanol extract and fractions of *Napoleonaeimperialis* leaves in castor oil-induced diarrhoea in albino rats. The crude extract was prepared from the plant's leaves and was subjected to phytochemical and acute toxicity tests. Thereafter, the extract was fractionated using column and thin layer chromatographic techniques. Antidiarrhoeal effect of the crude extract and fractions was evaluated using 80 rats assigned to 16 groups of 5 rats each. Group 1 served as control and group 2 was treated with Loperamide (0.5 mg/kg) while groups 3-16 were treated with specific dose levels of the crude extract or fractions. Thirty minutes after treatments, animals were induced orally by 1ml of castor oil orally and were placed individually in a cage with the bottom lined with weighed absorbent paper and diarrhoea episode was observed for a period of 3 hours. The parameters recorded included the onset of diarrhoeal stool (latent period), the number of both wet and dry stools and weight of the wet stools. The percentage inhibition recorded in the mean weight of faeces was highest in fraction 4(F4) at doses of 500mg/kg (95.40± 4.43) and 250mg/kg (93.73±4.97) respectively and the least in F3 at doses of 250mg/kg (22.31 ± 2.44) and 500mg/kg (25.25 ± 4.22). The loperamide treated group also recorded a high percentage inhibition of 92.84±5.23 at a dose of 0.4mg/kg. It was followed by the crude extract which also

recorded a high percentage inhibition of 89.51±8.10 and 88.23±6.28 at doses of 250mg/kg and 500mg/kg respectively. Other fractions followed a dose dependent manner. The crude extract at the doses of 250mg/kg and 500mg/kg significantly ($p<0.05$) reduced the total number of wet stool when compared with the negative control. The percentage inhibition for the extract at 250mg/kg and 500mg/kg are 71.28±3.73 and 81.23±6.92 respectively as against the negative control which recorded 0.00±0.00 inhibition. The standard drug loperamide (77.00±0.00) significantly reduced the frequency of defeacation when compared with the negative control. However, it was discovered that the crude at the dose of 500mg/kg significantly reduced the frequency of defeacation more than the standard drug loperamide. The fractions 1-6 decreased the frequency of diarrhoea when juxtaposed with the negative control group. Fraction 4 at the dose of 500mg/kg recorded the highest reduction in the frequency of defeacation by 92.55±6.71% followed by fraction 4 at the dose of 250mg/kg with a percentage inhibition of 80.63±3.90. Fraction 4 at the doses of 250mg/kg and 500mg/kg showed the maximum percentage inhibition. This study clearly showed from the results obtained that the crude extract and fractions of *Napoleonaeimperialis* leaves can be used as anti-diarrhoeal agent in indigenous medicine.

Keywords: *Napoleonaeimperialis,* diarrhoea, loperamide, stool

NSBMB/UPH/NB/059

Phytochemical Constituent, Nutritional Composition, *In vitro* Antioxidant Capacity and Toxicological Assessment of *Dennettia tripetala* leaves

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ABSTRACT

The leaves of *Dennettia tripetala* (DT) have been used in folk medicine for the management of fever, cough, asthma, catarrh, toothache, diarrhea and rheumatism. This study evaluated the phytochemical constituent, nutritional composition, and toxicological aspects of *Dennettia tripetala* leaves. Fresh samples of the leaves were air dried and blended to powder. Five hundred grams of the powder was macerated in methanol for 72 hours with intermittent stirring. This was then sieved and concentrated with rotary evaporator at 40ºC to obtain the crude extract. Nutritional composition, qualitative and quantitative phytochemical content, *In vitro* antioxidant capacity, High Performance Liquid Chromatography (HPLC) and Gas Chromatography Mass Spectrometry (GC-MS) were carried out in accordance with standard methods. Acute toxicity of methanol leaf extract was determined by Lorke's method. Proximate analysis results revealed that *Dennettia tripetala* leaves contain substantial amounts of proteins, lipids, carbohydrates, fibre and ash, with low moisture content. Qualitative phytochemical and HPLC analysis reveal appreciable amounts of cardiac glycosides, saponins, alkaloids, terpenoids, coumarins, tannins, phenols, amino acids and reducing sugars. Steroids

were sparingly present, while flavonoids were abundant. GC-MS analysis showed the presence of terpenoids, hydrocarbons and fatty acids. *In vitro* anti-oxidant analysis indicates that DT scavenged DPPH radical effectively and has a high total antioxidant capacity. Acute toxicity studies show that *Dennettia tripetala* had LD_{50} values >5,000 mg/kg body weight, with no mortality or signs of toxicity. This study has provided evidence for the use *Dennettia tripetala* leaves for medicinal purposes.

Keywords: *Dennettia tripetala*, phytochemicals, acute toxicity, Nutritional, Proximate

NSBMB/UPH/NB/060

Effect of Fermentation Time on Hydrocyanide Content of Cassava Flakes Produced in Rivers State, Nigeria

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ABSTRACT

The present study investigated the effect of duration of fermentation on hydrocyanide content of cassava flakes (*garri*)**.** Cassava samples were obtained from Baen Community, Khana Local Government Area, Rivers State, Nigeria. Processed samples were subjected to fermentation for seven days. Proximate composition was determined by standard methods and hydrocyanide content was determined by high-performance liquid chromatography (HPLC). Statistical analysis was done using SPSS. Proximate composition of the samples were as follows (days 1, 3, 5 and 7 respectively): moisture (12.99±0.01 %, 13.84±0.06 %, 14.07±0.00 %, 14.25±0.07 %), ash (0.30±0.00 %, 0.50±0.00 %, 0.60±0.13 %, 0.55±0.07 %), crude fat (4.19±0.28 %, 5.20±0.28 %, 3.89±0.14 %, 2.79±0.00 %), crude fibre (4.59±0.57 %, 3.40±0.84 %, 1.30±0.14 %, 1.60±0.00 %), crude protein (2.63±0.00 %, 3.49±0.00 %, 0.87±0.00 %, 0.88±0.00 %) and carbohydrate (75.30±0.84 %, 73.59±1.05 %, 79.28±0.13 %, 79.93±0.00 %); hydrocyanide content (mg) were as follows: Day 1 (2.95 ± 0.01 mg), Day 3 (2.53 ± 0.01 mg), Day 5 (1.74 ± 0.01 mg) and Day 7 (0.80 ± 0.01 mg). A significant reduction in hydrocyanide level was observed from day 1 to 7. Thus, longer fermentation time lowers hydrocyanide content of cassava flakes making it safer for consumers.

Keywords: Cassava, hydrocyanide, proximate, fermentation,

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Evaluation of Phytochemical, Antimicrobial Activities and Toxicological Analysis of Bitter Leaf (*V. amygdalina*) Extracts

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ABSTRACT

The phytochemical screening, antibacterial activities and in vivo toxicity of extracts of the leaves of bitter leaf (*V. amygdalina*) were investigated. All the analyses were carried out using standard scientific procedures using crude extraction, well-diffusion agar antimicrobial testing, and in vivo acute toxicity testing. The phytochemical analysis according to standard screening tests using conventional protocols revealed the presence of alkaloids, flavonoids, saponins, Cardiac Glycoside, tannins, steroids, resins, protein, and carbohydrates in all the extracts analyzed which indicates their high level of possible medicinal and dietary values. But, flavonoids, tannins, resins, and protein were not in the n-hexane extracts analyzed. The extract fractions generally exhibited high antibacterial activities on Staphylococcus aureus, *Klebsiella pneumonia*, Bacillus subtilis, Salmonella typhi and Escherichia coli. The minimum inhibitory concentration of *V. amygdalina* was determined with all the isolates recording MICs at the lowest concentration (12.5 mg/mL) of the ethanol and ethyl acetate extracts used. The in vivo toxicity of *V. amygdalina* extracts against albino rats revealed that the plant extracts were found to exhibit mild toxicity at higher doses, but the overall remark showed that the plant extract was safe at various concentrations. It was observed that (RBC, Hb, PCV, MCV, MCH, and MCHC) showed non-significant ($p>0.05$) changes on the 28th day. There was a dose–dependent significant increase ($p< 0.05$) in WBC and Lymphocyte; while neutrophils count decreased significantly ($p< 0.05$) in a dose-dependent manner. Serum platelet level decreased significantly ($p< 0.05$) if the level of dose increases. The plant can be used in the treatment of various diseases caused by the test microbes, and the plant has less toxicity when administered orally.

Keywords: *V. amygdalina*; phytochemistry; toxicology; antimicrobial; minimum inhibitory concentration.

NSBMB/UPH/NB/062

Nutritional and Gas chromatography- Mass Spectrometry evaluation of meal worm frass from *Triplochyton scleroxylon* wood

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ABSTRACT

Due to the increasing population growth rate, the mass breeding of insects for feed and food is now in full industrial development as an alternative to conventional livestock for animal protein production. Therefore, insect breeding is expected to increase dramatically in the next few years, leading to high quantities of frass (excrement of insects). Insect frass, the excrement of insects, has garnered increasing attention in recent years due to its potential applications in agriculture and medicine. In agricultural practices, insect frass is a valuable organic fertilizer, rich in essential nutrients and beneficial microorganisms. Its application has enhanced soil fertility, improved plant growth, and increased crop yields. Its therapeutic, phytochemical, functional composition and animal usage is little known. Within 60 days, this study isolated mealworm frass (2000 g) from window frames made of obeche (Triplochyton scleroxylon) wood. We investigate frass's nutritional, elemental, and functional composition using AOAC, inductively coupled plasma atomic emission spectroscopy (ICP-AES), and gas chromatography-mass spectroscopy (GC-MS). Data from the proximate analysis revealed content (8.67%), protein (2.22%), crude fat (3.05%), crude fibre (47.20%), ash (3.90%), and carbohydrate (34.96%) content. Elemental analysis detected a tremendous amount of calcium (314.23 mg/100g), magnesium (85.58 mg/100g), iron (14.93 mg/100g), zinc (9.02 mg/100g), copper (1.52 mg/100g), and manganese (1.73 mg/100g). GC-MS detected twenty-six (26) compounds, including 1,2-benzenedicarboxylic acid (23.42%) and 1-heptadecene (14.81%). 1-pentadecene (6.04%), 4,8,12,16-tetramethylheptadecan-4-olide (5.71 %), and phenol (5.58 %) as the most predominant compounds. According to this study, Mealworm frass contains various nutrients rich in crude fibre and essential minerals, suggesting potential uses in animal feeds, dietary supplements, and as a drug binder in pharmaceuticals.

Keywords: Fertilizer, Nutrients, Functional, Therapeutic, Insect frass

NSBMB/UPH/NB/063

Studies on the phytochemical composition of aqueous leaf extracts of *Justicia carnea* and *Cnidoscolus aconitifolius*

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ABSTRACT

Medicinal plants are cost effective therapeutic agents used traditionally in the management of several illness. Chemical analyses were carried out to determine the phytochemical constituents of leaves of two indigenous African plants, *Justicia carnea* and *Cnisdoscolus aconitifolius*. Phytochemical analysis of fresh leaves of *J. carnea* (20.40g of yield) showed: 9.19 ± 0.15 mg/g (phenol), 7.06 ± 0.05 mg/g (flavonoids), 5.91 ± 0.30 mg/g (reducing sugars), 5.77 ± 0.40 mg/g (alkaloids), 5.39 ± 0.49 mg/g (glycosides), 4.10 ± 0.09 mg/g (carbohydrate), 1.18 ± 0.01 mg/g (saponins) and 0.70 ± 0.00 mg/g (tannins) and *C. aconitifolius (*22.02g yield); 8.09 ± 0.15 mg/g (phenol), 7.04 ± 0.05 mg/g (flavonoids), 4.91 ± 0.30 mg/g (reducing sugars), 5.27 ± 0.40 mg/g (alkaloids), 5.03 ± 0.49 mg/g (glycosides), 3.20 ± 0.09 mg/g (carbohydrate), 1.02 ± 0.01 mg/g (saponins) and 0.70 ± 0.00 mg/g (tannins). There was a significant presence of alkaloids, saponins, flavonoids, tannins and ascorbic acid in both leaves; terpenoids was found in trace amount. Steroids were present in *C. aconitifolius* and absent in *J. carnea*. These phytochemicals are of therapeutic importance; their presence in *J. carnea* and *C. aconitifolius* leaves, however, indicate the beneficial effects of these leaves. *Justicia carnea* contained higher levels of the beneficial agents than *C. aconitifolius*. The two indigenous plants are not only nutritionally and therapeutically valuable, but also have the potential of providing precursors for the synthesis of useful drugs and could serves as an effective haematinic agent.

Keywords: African plants, *Justicia carnea*, *Cnidoscolus aconitifolius*, Aqueous extract, phytochemicals.

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Gender Differences in Factors Associated with Obesity and Hypertension Amongst Nigerian University Staff

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ABSTRACT

Obesity and hypertension are major global public health issues that significantly impact individual well-being and workforce efficiency. This study was aims to describe the gender variation in the factors associated with overweight, obesity and hypertension amongst Staff of a Nigerian university. This cross-sectional study was conducted among 510 academic staff and non- academic staff of Edo State University Uzairue, Edo State, Nigeria. A pre-tested questionnaire was used to obtain information on socio-demographic, anthropometric indices and blood pressure, both were measured following standard procedure**.** Data were analysed using student's independent T-test and Chi-square test with $p \leq 0.05$ considered as being statistically significant. Age was 39.8 ± 8.3 years, 73.5% were married. The overall prevalence of overweight and obesity was 49.3%. Overweight was significantly higher in males (91.2%) than females (80.7%) while obesity was significantly higher in females (19.3%) than males

(8.8%). Abdominal obesity was more common in females (86.3%) than males (16.5%). Body mass index was higher in females (27.7 ± 2.6) compared to males (26.9 ± 2.1); Waist to hip ratio was higher in males (0.9 ± 0.0) than females (0.8 ± 0.1). Systolic blood pressure was higher in males (118.3 ± 12.8) than females (114.6 ± 11.1) The prevalence of hypertension was 8.3%; higher in males (13.2%) than females (5.6%) and predominant among staff weighing 76 to 95kg in both gender groups. Among female university staff, overweight and obesity were significantly associated with occupation. Hypertension was significantly associated with weight and waist to hip ratio in both genders. Overweight and obesity were high among university staff in both genders; prevalence and associated factors differ by gender. Hypertension was more prevalent among male staff. These findings highlight the need for gender-specific health intervention in other to reduce the risks of obesity and hypertension among staff thereby enhancing overall health and workplace productivity.

Keywords: Overweight, obesity, university staff, hypertension.

NSBMB/UPH/NB/065

Effect of domestic heat processing techniques on the trace metals concentration in imported frozen fish products in Bayelsa State, Nigeria, and health risk assessment.

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ABSTRACT

Trace metals in fish play different important roles, both for the fish itself and humans who consume them. However, some of these metals are toxic at low concentrations, and are considered as health hazards. In this study, the concentration of six trace metals (Pb, Cd, Ni, Cu, Mn and Zn) were determined in imported frozen fish species available in Bayelsa State, Nigeria. The effect of domestic heat processing techniques (cooking, frying and smoking) on the trace metals concentration, and the potential risk due to consumption of these metals in fish were also evaluated. The average trace metals concentration in the raw fish samples followed the order: Zn > Cu > Cd > Ni > Mn. Pb was undetected in all fish samples. The concentration of the detected trace metals ranged as follows - Cd: 3.45-9.40 mg/kg, Ni: <0.001-13.13 mg/kg, Cu: 6.10-9.95 mg/kg, Mn: <0.001-1.05 mg/kg, and Zn: 14.50-43.65 mg/kg. The Cd concentration in all raw fish species greatly exceeded its permissible limits. The effect of domestic heat processing techniques on trace metals concentration in fish did not follow any regular pattern, and only Cd concentrations exceeded its permissible limit in all heat processed fish samples. The hazard quotient (HQ) values showed that only Cd had HQ values >1 for both child and adult exposure scenarios. The results suggest trace metal contamination of fish samples by Cd, with significant potential non-carcinogenic risk. Since Cd is toxic, continuous screening of imported fish products is necessary, in order to safeguard public health.

Keywords: Imported frozen fish, trace metals, hazard quotient, non-carcinogenic risk

NSBMB/UPH/NB/066

African Pear Seed Ameliorates Placenta-Driven Anti-Angiogenic Secretions, Maternal Vascular Phenotype, and Fetal Growth Restriction in a Rat Model of Preeclampsia

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ABSTRACT

African pear seed extract (*D. edulis*) is one of the most common herbal therapies for preeclampsia in Nigeria. Previously, we reported an abundance of cardiac and quercetin glycosides in *D. edulis* seeds and showed that the extract improved dysregulation of nitric oxide homeostasis in an L-NAME model of endothelial damage. In this current study, we examined the effect of its aqueous extract (PS) in the well-established L-NAME rat model of preeclampsia. Seven normotensive dams received only normal chow and saline, while fourteen preeclamptic dams were either designated as the placebo group or treatment group orally administered 1ml of the 200mg/ml pear seed extract (PS) from gestation day (GD) 15 – 19. Plasma, placenta, heart, and uterine arteries samples were isolated and examined. Fetal growth restriction and resorption of the uterine horns were ameliorated after the treatment. PS inhibited excessive secretion of TNFα and its receptor TNFR1. The BP decreased from 145/90 mmHg to 130/80 mmHg and ameliorated the cardiac troponin T (CnT) and angiotensin II (ANGII), soluble fms-like tyrosine kinase-1 (sFLT-1), PlGF, and VEGF activities. Histological examination showed improved multifocal areas of myocytes degeneration, mild vacuolar swelling of the decidua cells with restored glycogen storage cells. The isolated uterine arteries from rats after treatment group showed improved basal metabolic rate and synthesis of angiotensin type 1 receptor. With the obvious improvement in fetal development, this therapy has the potential to become the first traditional medicine approved for the conventional management of maternal and fetal complications of preeclampsia.

Keywords: Preeclampsia; hypertension; pregnancy; *D. edulis*; Placenta

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Evaluation of Nutritional Content and Organoleptic Score of Masa Produced From Sprouted Water Melon Seeds and Muruchi (Borassus Aethiopum) Composite

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ABSTRACT

Masa is a starch-based snack, popularly consumed in the Northern region of Nigeria. This study investigated the nutritional content and organoleptic score of the Masa produced from sprouted water melon seeds and muruchi composite. The proximate compositions of Muruchi and water melon seeds were determined following standard procedures as well as antinutrients composition of sprouted water melon seeds. Six different blends of Muruchi and sprouted water melon seeds were used to produce Masa with rice as the control. The samples were labeled; A, B, C, D, E and F. Sample A (100% Rice); Sample B (100% Muruchi); Sample C (Rice and sprouted water Melon seeds, 70:30); Sample D (muruchi and sprouted watermelon seeds (70:30); Sample E (Rice and muruchi, 50:50) Sample F (rice, muruchi and sprouted watermelon seeds 50:30:20). Proximate composition and organoleptic score of the masa produced from the six different blends were determined to assess the acceptability of the Masa. The shelf-life was also determined for 16 days. Results show that protein (23.23±0.19%) and Fat (22.92±0.00%) of the sprouted water melon seeds significantly increased on day 6; while had muruchi had high carbohydrate (76.75±0.7%). The sprouted water Melon seeds had vitamins B1 and E increased by more than 50 % (55.71 and 58.33 % respectively) while vitamins B2, B3, B6 and B12 increased by 30.23, 37.50, 30.00 and 30.77 % respectively. Vitamins C and A increased by 26.80 and 18.97 % respectively while vitamin D had the least % increase (16.67 %). Decrease in the level of antinutrients was observed with highest decrease in tannins (9.66±0.12) at day 6, the result shows incorporation of sprouted water melon seeds improve the fat and protein content of Masa in sample C(34.49±0.33,14.28±0.02) and D(33.00±0.0,15.84±0.01) respectively. Additionally, incorporation of sprouted water melon seeds improved the acceptability of sample B (7.8±1.32). The microbial study showed no growth from day 0 to day 6 but, growth was observed at day 8 . The fact that Masa from B (100 % Muruchi flour) shows no bacterial growth even at day 10 suggests that muruchi may have antimicrobial property The study has shown that the incorporation of sprouted water melon seeds improved nutritional and organoleptic properties of Masa.

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Castor Oilseeds: Composition, Properties and Economic Importance

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ABSTRACT

Castor oil seeds (*Ricinus communis*) derived from the castor plant, hold a significant economic value due to their unique composition and properties. The major constituents of the seeds are the lipids, carbohydrates, nucleic acids and a toxic protein called Ricin. The seeds contain between 40% and 60% oil. Castor oil is unique among vegetable oils because it's the only commercial source of a hydroxylated fatty acid. The oil contains high content of Ricinoleic acid, a fatty acid with exceptional characteristics significant for many industrial uses compared with other oils from plant sources because of its high and low temperature-tolerant properties. Low moisture content which is a characteristics of good shelf life and other chemical and physical properties derived from these seeds including low pH, viscosity, high boiling point and high saponification value will be discussed. Castor oil composition including fatty acid, Triglycerides, and other minor bioactive compounds that consist of unsaponifiable fractions are summarized. The economic importance of castor oilseeds, its diverse applications in agriculture, medicals, pharmaceuticals, cosmetics and green biofuel production is also discussed. These paper highlights the diverse industrial and commercial applications of castor oil seeds.

Keywords: Castor oilseeds, condiment, fatty acids and applications

NSBMB/UPH/NB/069

Phytochemical Screening and *In Vitro* Antioxidant Activities of Aqueous and Ethanolic Extracts of *Commiphora africana* (MYRRH) Leaves and Gum Resin

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ABSTRACT

Commiphora africana (Myrrh) is a resourceful medicinal plant owing to the usefulness of almost all parts of the plant in traditional and folklore medicine in the treatment of degenerative diseases. In this study, the aqueous and ethanolic extracts of *Commiphora africana* (myrrh) leaves and gum resin were screened for phytochemical constituents and *in vitro* antioxidant activities of the extracts were investigated. Our results showed presence of alkaloids, tannins, saponins, terpenoids, flavonoids, phenols and glycosides. However, Steroids was absent in both leaves and gum resin. Also, Anthraquinone was present in gum resin and absent in leave extracts. The gum resin (48.01±1.69%) revealed significantly higher (P<0.05) phenol content than in the leaves (43.65±0.49%). However, flavonoid content in the leaf (4.2±0.44%) was significantly higher (P<0.05) in leaves extracts than gum resin (3.3 ± 0.13 %). The antioxidant activity of the concentrated extracts was determined using 2, 2 - diphenyl-picrylhydrazyl (DPPH), Ferric acid reducing antioxidant power (FRAP) and Thiobabituric acid reactive substance (TBARs). The ethanol extracts of the leaves and gum resin (78.10± 0.32% and 80.72 ± 0.39 % respectively) showed a significantly higher (P<0.05) percentage of DPPH scavenging activities than that of the aqueous extract. The FRAP assay revealed the higher (P<0.05) antioxidant activity in aqueous extracts of the leave and gum resin (91.05 ±0.35% and 92.04± 0.38 % respectively) than those of the ethanolic extracts. In TBARs assay, the aqueous extracts showed higher (P<0.05) activity compared to the ethanolic extracts. This study has revealed the antioxidant potency of the examined, suggesting that the extracts are promising in combating free radicals-mediated diseases and prevent further degenerative diseases.

Keywords: *Commiphora africana,* Antioxidants, Gum resin, Free radicals

NSBMB/UPH/NB/070

Health Benefits of Brown Rice: A Review on its Nutritional Value and Potential Role in Mitigating Non-Communicable Chronic Diseases

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ABSTRACT

Nutrition-related Non-communicable chronic diseases (NCCDs) like type 2 diabetes, cancers, cardiovascular diseases and hypertension are the leading causes of morbidity and mortality worldwide. The increasing occurrence of these diseases forced the scientific community to embark on research to find the link between such diseases and the foods widely consumed in

different places. Rice, a staple food for nearly half of the world's population have received attention from all angles worldwide. White rice (WR), which primarily consists of starch, is produced from whole rice through a series of mechanized processes including hulling and milling and it is the predominant type of rice consumed worldwide. The complete milling and polishing destroys many nutrients and bioactive compounds. This led researchers to perform many studies to investigate the potential health benefits for the consumption of whole brown rice (BR) grain in comparison to WR. This study aimed at reviewing the various nutritional and potential health benefits of BR. The study reviewed the taxonomy and bioactive composition of rice, the roles of BR in insulin signalling, the metabolic effects of rice consumption was also discussed, and the Antioxidant activity of BR, as well as the link between oxidative stress and insulin resistance, was also discussed. The review concludes that consumption of WR increases hyperglycaemia, and dyslipidaemia and worsens antioxidant status. The study also showed that these effects can be ameliorated by the consumption of BR. Therefore, it can be concluded from this study that substitution of the widely consumed WR with BR may reduce the risk of various chronic diseases and their related complications. Similarly, the presence of multiple beneficial bioactive compounds in BR may contribute to the observed effects due to BR consumption.

Keywords: brown rice, white rice, chronic diseases, health benefits, staple food.

NSBMB/UPH/NB/071

Effect of Induced Ageing on Viability and Nutrient Levels of Selected Sesame Seed Accessions

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ABSTRACT

The proximate composition, fatty acids and amino acids profiles and Catalase activity of the aged seeds were determined based on standard methods of the association of official Analytical Chemists (AOAC),the Seqential Multi-sample analyzer (TSM). The results revealed significant variations in chemical composition and oil yield of the seeds of the sesame accessions. NCRIBEN 203 had significantly higher oil yield (54.6%) compared to NCRIBEN106 which had the lowest (28.6%) all through the aging period ($p<0.05$). Percentage moisture, protein, fibre, fat, carbohydrate and ash in the seeds ranged from 1.76 to 3.70, 21.15 to 25.29, 3.84 to 4.30, 44.9 to 52.8, 8.94 to 18.15 and 5.75 to 6.50%, respectively. Accession NCRIBEN131 had a significantly higher fat content (53.54%) and protein (25.18%) than other accessions ($p<0.05$). There was a significantly progressive decrease in catalase enzyme activity from day 0-6days ($p<0.05$) of ageing. The fatty acid profile showed that polyunsaturated (PUFA) had the highest concentration in NCRIBEN106 (108.76±0.001µg/g) compared to the other four accessions. There was progressive increase in amino acid concentration with ageing

from 0-3days before decline at day 6. Total non-essential amino acid (TNEAA) has the highest concentration in all the five accessions which ranged from 10.34±0.02mg/100g (NCRIBEN106) to 6.67±0.01mg/100g (NCRIBEN 131) when compared to total aromatic amino acid (TArAA) and total essential amino acid (TEAA) compositions. From the study, it can be concluded that accelerated aging affects the nutrient composition of sesame seed negatively by reducing the nutrient, hence reduction in the shelf life of the seed.

Keywords: Accelerated ageing, *Sesamum indicum L*., Moisture content, Fatty acid profile, Amino acid profile and Catalase activity.

NSBMB/UPH/NB/072

Phytochemical Content, *In Vitro* antioxidant Activities and Acute toxicity Study of Methanol Extract and Fractions of *Cadaba farinosa*

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ABSTRACT

Medicinal plants represent the most ancient form of medication, used for thousands of years in traditional medicine worldwide owing to their availability and affordability. This study was aimed at determining the phytochemical constituents, *In vitro* antioxidant activity and acute toxicity study of the methanol extracts and fractions of *Cadaba farinosa* leaves. Standard methods were used to determine the phytochemical contents and *in vitro* antioxidant activities. The Lorke's method was employed for the acute toxicity study. Phenols, tannins, steroids, terpenoids, coumarins and quinones were detected in all the methanol extract and all the fractions. Cardiac glycosides and alkaloids were not detected in the extract and all the fractions. Flavonoids and saponins were detected in all but hydromethanol and n-hexane fractions respectively. The quantified phytochemicals were in the decreasing order of HM > EA> CHL> MeOH> n-Hex for total phenols (mg Gallic acid eq/g of extract), EA > n-Hex > CHL > HM > MeOH for total flavonoids (mg Quercetin eq/g of extract) and HM > EA > CHL > n-Hex > MeOH. (Tannic acid eq/g of extract). All fractions and extracts scavenged the DPPH (2,2-Diphenyl-1-picrylhydrazyl) free radical at a higher than 50 % scavenging capacity. However, the ethyl acetate fraction recorded the highest Ferric Reducing Antioxidant Potential (FRAP) while the methanol extracts had the highest Reducing Power (RP). The plant did not show signs of toxicity at a dose of 5000 mg/kg body weight. This study showed *Cadaba farinosa* can be explored in development of potent therapeutic agents.

Keywords: *Cadaba farinosa,* Phytochemicals, Antioxidants, Toxicity, free radicals

NSBMB/UPH/NB/073

Investigation of the Nutritional Composition of *Tephrosia Bracteolata* Seed

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ABSTRACT

This study was designed to investigate the nutritional compositions of *Tephrosia bracteolata* in an attempt to bring out the nutritional potential of this under-utilized legume. The seeds were prepared adequately and subjected to various laboratory techniques. It was then analyzed for proximate composition, amino acids profile, some micronutrient and anti-nutrients compositions afterwards. The result of the proximate analysis shows 27.13% crude protein, 18.05% crude fat 41.34% total carbohydrate, 12.33% crude fibre, 4.42% ash and 9.40% moisture. Values for anti-nutrients; saponin, tannin, phytate, oxalate, cyanide and trypsin inhibitor are 7.93mg/100g, 3.18mg/100g, 1.21mg/100g, 0.52mg/100g, 0.08mg/100g, 0.00148mg/100g respectively. Vitamin A content is 1.01 mg/100g, vitamin C 57.47mg/100g and vitamin E 1.19mg/100g. All minerals (Ca, Mg, Fe, Zn, K, and P) analysed are found present with levels of 184.37, 63.46, 108.36, 29.43, 931.83, 410.36mg/100g respectively. Amino Acid profile of the seed of *T.bracteolata* showed that leucine, lysine, isoleucine, phenylalanin, tryptophan, valine, methionine, histidine and threonine were present in sufficient amount when compared with reference standards. Non-essential amino acids were also present in abundant amount; Aspartate and Glutamate were the most abundant followed by Alanine, Arginine, Proline and Serine. Calculated amino acid score reveals that this plant is of higher protein quality. Overall, the results of the study showed that *T.bracteolata* is a very good source of nutrient and can be useful in solving malnutrition problems.

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A Comparative Study on the Effects of Aqueous Extracts of Some Seed Wastes in Diabetic Rats

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ABSTRACT

This study investigated a comparative study on the effects of aqueous extracts of some seed wastes in diabetic rats. Forty Wistar rats (120g to 154g) were divided into eight groups (n=5): normal control (group 1), negative control (group 2), positive control treated with metformin (150 mg/kg body weight), and four treatment groups receiving doses of 300mg/kg and 600mg/kg b.w of *Dacryodes edulis* and *Persea americana* extracts. After inducing diabetes with alloxan (155 mg/kg), the rats underwent two weeks of treatment. The nutrient evaluation

and biochemical studies followed standard methods. Proximate analysis revealed *Dacryodes edulis* and *Persea americana* had the highest carbohydrate content (46.376% and 43.776%, respectively). Amino acid analysis showed glutamine (13.38883 µg/g) was highest for *Dacryodes edulis* and leucine (7.06893 µg/g) for *Persea americana*. Oleic acid was predominant in both *Dacryodes edulis* (29.887%) and *Persea americana* (46.267%). *Dacryodes edulis* had higher total phenol concentrations (0.645mg/ml) while *Persea americana* had higher total flavonoid concentrations (1.862mg/ml). Octadecenoic acid was the highest Essential oil component in *Dacryodes edulis* (33.38%), while Butylated Hydroxytoluene dominated in *Persea americana* (39.42%). Both extracts exhibited antioxidant activities with varying inhibition percentages at various concentrations. Treatments with both extracts led to dose-dependent improvements in biochemical assays, significantly ($p \leq 0.05$) decreasing blood glucose levels, LDL, TC, TG, ALP, AST, and ALT, while increasing HDL, albumin, and total protein, compared to negative controls. Hematological parameters, oxidative stress markers, and kidney biomarkers also showed improvement. These findings conclude the therapeutic potential of *Dacryodes edulis* and *Persea americana* extracts in managing diabetes mellitus.

Keywords: Seed wastes; alloxan-induced diabetes; nutrient evaluation; fasting blood sugar; kidney biomarkers

NSBMB/UPH/NB/075

Dietary Calabash Chalk Induced Declined Reproductive Fitness in Harwich Strain *Drosophila Melanogaster*

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ABSTRACT

Calabash chalk is a naturally occurring mineral, its consumption became widespread in Nigeria among pregnant women for remedy of morning sickness. Despite increased consumption, there is no scientific prove to justify this claim. The study aimed at finding the effects of dietary consumption of calabash chalk (CCH) on the fecundity, filial output in *Drosophila melanogaster* (Harwich strain). The similarities in basic physiological mechanisms between humans and *Drosophila* makes the fruit fly a promising model for the study. The study was performed using standard methods. The LC50 of the CCH was determined as 1800mg/kg of 10g of Standard corn meal diet. The study was performed in five groups with control; Group 1 control fed on 10g diet, group 2,3,4,5 fed on 225mg,450mg,900mg and 1800mg of CCH in 10g standard corn meal diet respectively for 30days respectively. The results indicate a statistical

decrease ($p < 0.05$) in fecundity (egg laid) and filial output (filial eclosion) in the 900mg and 1800 mg CCH diet fed flies compared to the control. In conclusion: CCH consumption causes a decrease in reproductive fitness (fecundity) and filial output in *D. melanogaster* (Harwich strain) this finding justifies the deleterious effect of CCH on reproductive and eclosion in the physiology of the fruit fly.

NSBMB/UPH/NB/076

Nutrients Composition of Selected Green Vegetables Sold at Fruit Garden Market in Port Harcourt

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ABSTRACT

Green vegetables are incredible source of vitamins, minerals, and various nutrients needed for healthy health. Hence the need to determine the proximate, vitamin, and mineral composition ofsome green vegetables purchased at fruit garden market, Port-Harcourt. Proximate, vitamins, and minerals composition were determined using standard methods; (AOAC for proximate, APHA for minerals, and spectrophotometric method for vitamins). The result of the proximate composition showed that the percentage fibre (0.28 ± 0.05 - 1.37 ± 0.05) and protein content (1.12 ± 0.03 - 2.89 ± 0.12) were significantly higher in *Corchorus olitorius* than in other samples. Ash content value of *Murray koenigii* was significantly higher. Also, percentage moisture content (51.67 ± 0.07 - 76.15 ± 0.11) was higher in *Allium fistulosum* while carbohydrate content (16.82 ± 0.09 - 40.20 ± 0.06) was significantly higher in *Ocimum basilicum*. The result of the vitamin composition showed that vitamins A, B1, B2, B6 and D were significantly higher in *Murray koenigii* when compared with other vegetables. Vitamins B3, B12, C and E values were significantly higher in*Corchorus olitorius* when compared with other vegetables. The result of the mineral composition showed that manganese was significantly higher in *Murray koenigii* when compared with other vegetables while iron, zinc and lead values were higher in *Mentha xpiperita* when compared with others. Selenium value was significantly higher in *Ocimumbasilicum*when compared with other vegetables. Cadmium, cobalt and chromium values had no signicant difference in the vegetables. This work showed that *Corchorus olitorius, Mentha xpiperita, Allium fistulosum, Ocimum basilicum*, and *Murray koenigii* can act as supplementary sources of essential nutrients such as minerals and vitamins.

Keywords: Vegetables, Proximate, Vitamins Minerals

NSBMB/UPH/NB/077

Consolidated Bioprocessing and Simultaneous Saccharification and Fermentation of Corn Flour Using *Pichia kudriavzevii* and *Meyerozyma guilliermondii* Strains.

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ABSTRACT

The escalating global demand for renewable energy stems from concerns about climate change, energy security, and the finite nature of fossil fuels. Bioethanol, sourced from biomass, emerges as a promising sustainable alternative for both transportation and energy production, addressing these critical challenges. The aim of this study is to apply consolidated bioprocessing (CBP) and simultaneous saccharification and fermentation (SSF) processes for bioethanol production from corn flour using *Pichia kudriavzevii* and *Meyerozyma guilliermondii* strains. Dry corn grains were purchased from a local market, and ground to flour using an industrial grinding machine, while *P. kudriavzevii* strains were obtained from a stock culture and *M. guilliermondii*, isolated from fresh palm wine. A fermentation period of 7 days was carried out. From the results obtained, CBP and SSF of *P. kudriavzevii* strain B exhibited optimum bioethanol yield of 0.249g/g and 0.260g/g with fermentation efficiency of 48% and 51% respectively, while *P. kudriavzevii* strain A had 0.217g/g and 0.241g/g bioethanol yield with 42% and 47% fermentation efficiency respectively after 24 hr. However, least bioethanol yield of 0.190g/g and 0.186g/g and efficiency of 37.18% and 36.40% were observed for CBP and SSF of *M. guilliermondii* strain Q2 respectively after 72 hrs. From the results, both strains efficiently utilised corn flour for bioethanol production, although, *Pichia* strains yielded more bioethanol compared to *M. guilliermondii* owing to its higher productivity. However, *M. guilliermondii* demonstrated higher tolerance to elevated glucose and ethanol levels for 48hrs of fermentation. The above fermentation optimized conditions, when applied industrially could lead to a more efficient utilization of these organism for bioethanol production.

NSBMB/UPH/NB/078

Nutritional Assessment of Hausa Potato *Solenostemon rotundifolius (Poir)*

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ABSTRACT

*The Hausa potato (Solenostemon rotundifolius (Poir) is a tropical, multipurpose, minor tuber crop. This study was designed to carry out proximate composition and determination of some elements in Hausa potato. The moisture, ash, crude lipid, crude protein and crude fiber contents of both uncooked and cooked Hausa potato samples were determined according to the standard method. The elemental composition was determined using the Unicom Solar Atomic Absorption Spectrophotometer. The results showed that the samples were high in carbohydrate but low in lipid contents. Although Hausa potato was significantly high in moisture, carbohydrate and crude protein contents were not significantly different (*P *<0.05) in both samples. Whereas boiling improved the availability of carbohydrate and fiber, boiling also reduced the ash content, protein composition and fat in the tuber sample. Cooking significantly lowers the calcium, potassium, phosphorus, sodium and magnesium contents in the sample. Cooking remarkably reduced the anti-nutrient contents of Hausa potato. It is recommended that further studies should be carried out to determine other nutritional composition of various branches such as volatile oils, sesquiterpenes and diterpenes compositions and antimicrobial activities.*

Keywords: Hausa potato, Proximate, Nutritional, elements, Atomic Absorption Spectrophotometer

NSBMB/UPH/NB/079

Preliminary Studies on the Hypoglycaemic Effects of *Vernonia amygdalina* (African Bitter Leaf) on Streptozotocin Induced Diabetic Albino Wistar Rats

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ABSTRACT

Research interest has focused on various herbs that possess anti diabetic components thereby birthing scientific growth in complementary or alternative medicine. Diabetes Mellitus (DM) is a metabolic disorder characterized by elevated blood sugar over a prolonged period of time, which affects about 10% of adult population above 20 years, with a significant impact on the health, healthcare system, quality of life and generally, life expectancy. *Vernonia amygdalina* popularly known as African Bitter Leaf plant, with a Nigerian origin have a characteristic odor and bitter taste, has been documented for its anti-microbial activities and its colloquial use to control blood sugar. This abstract focuses on the use of the plant *V. amygdalina* in the management and treatment of DM, using Streptozotocin (STZ) Induced Wistar rats, with a view to understanding its mechanism of action. Fresh leaves of *V. amygdalina* were obtained

and identified, 78 albino wistar rats of similar weight of about 275g aged about 22 weeks, acclimatized and grouped accordingly. Diabetes was induced by an intraperitoneal administration of a single dose of STZ at 150mg/kg body weight in 0.1 M sodium citrate buffer, pH 4.5 after an overnight fast. Glucose concentration was determined 24 hours after STZ administration. Treatment with 1.0mg/ml, 2.0mg/ml and 5.0mg/ml aqueous extract *V. amygdalina* ensued. Blood glucose level measured after 14 days treatment decreased significantly with 1.0mg/ml {(229.0 +/- 18.18mg/dl); 2.0mg/ml (148.14 +/- 23.3 mg/dl); and 5.0mg/ml (154.18 +/- 25.45 mg/dl)} $P < 0.05$ as compared with the non diabetic control (352.36 mg/dl $P < 0.05$). Interestingly, animals treated with 2.0mg/ml and 5.0mg/ml aqueous extract of *V. amygdalina* became normoglycaemic. Therefore, the present study demonstrates administration of aqueous extract of *V. amygdalina* improved glucose tolerance in a dose dependent level.

Keywords: **Diabetes Mellitus *Vernonia amygdalina* Blood Glucose.**

NSBMB/UPH/NB/080

Anti-Nociceptive Activities of the Aqueous Dried *Zingibar officinale* Rhizome Extract (Zingiberacae) in Mice

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ABSTRACT

Zingibar officinale rhizome (Zingiberacae) is an ancient plant widely grown in Asia, tropical Africa and has been used in different conditions including emesis, osteoarthritis, pain etc. it has also been found useful as spice to add flavours to foods for centuries. In this study the aqueous extract of *Zingibar officinale* was screened for acute toxicity and analgesic activity. The acute toxicity profile of the aqueous extract was studied via oral routes in mice using Lorke's method while the analgesic activities were investigated using the hot-plate and the acetic acid induced writhing method. Results of the oral acute toxicity revealed the LD_{50} value of 2154.07mg/kg in the hot-plate induced pain model, the extract significantly ($p<0.05$) reduced pain at oral doses of 100 and 200mg/kg while in the acetic acid-induced abdominal writings, the extract significantly ($p<0.05$) reduced abdominal writhes at oral doses of 100 and 200mg/kg. these results revealed that the aqueous dried *Zingibar officinale* may be slightly toxic and possess a significant analgesic activity, however not as observed with the positive

control (piroxicam). The findings in this study support the ethnomedical uses of dried aqueous *Zingibar officinale* rhizome in the management of pain associated medical conditions such as osteoarthritis.

Keywords: Analgesic, Aqueous, *Zingibar officinale*, Pain, LD_{50}

NSBMB/UPH/NB/081

Phytochemical Analysis, Toxicity and Antiulcer Effects of Aqueous Leaf Extract Of *Curcuma zedoaria* (Christm.) Roscoe In Male Albino Rats

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ABSTRACT

This research was designed to examine the phytochemical analysis, toxicity and antiulcer activities of aqueous leaf extract of *Curcuma zedoaria* (white tumeric) in male albino rats. The experimental animals were separated into 3 groups of 8 rats each. Group 1 as the control while groups 2 and 3 received 500mg/kg and 1000mg/kg of the extract respectively for a period of 21 days. Gas chromatography mass spectroscopy (GC-MS) of the extract identified 16 compounds with 3-O-methyl-d-glucose and 3-methylbutylester as the most abundant phytocomponents with percentage area of 63.13% and 15.65% respectively. Molecular docking of *Helicopter pylori* HtrA (PDB 5Y2D) against cyclohexanone (CD 7967) showed highest binding affinity at position 3 with a vina score of -4.2. Acute toxicity study shows the extract is safe for oral administration at 500mg/kg. A dose dependent increase in weight was recorded for all treatment groups during the course of the study. Compared to the control, total cholesterol and high density lipoprotein-cholesterol (HDL-C) increased significantly ($p>0.05$) while a dose dependent increase was recorded for glutathione peroxidase (GPx) and superoxide dismutase (SOD) on serum antioxidant markers. Tissue antioxidant status increased nonsignificantly ($p<0.05$) for glutathione peroxidase (GPx), reduced glutathione (GSH), catalsse (CAT) and malondaldehyde (MDA) for the heart and liver tissues. Compared to the control, fertility, renal and liver function markers were all significantly different ($p>0.05$) with a dose dependent increase recorded for platelete count, lymphocytes, and basophils. Furthermore, mean corpuscular volume, mean corpuscular hemoglobin, cardiac troponin, Interleukin 1beta (IL-1β) and tumor necrosis factor alpha (TNF-α) increased significantly compared to the control. Sections of the heart, liver and kidneys presented in the histology showed normal myocardial hepatic and renal histomorphology. Our findings states that elevated HDL-C from oral administration of aqueous leaf extract of *C. zedoaria* could have

beneficial effects on cardiovascular health. However, this study concludes that aqueous leaf extract of *C. zedoaria* is generally safe for consumption and may offer therapeutic benefits.

Keywords: *Curcuma zedoaria*, Phytocomponents, Toxicity, Antiulcer, Gas chromatography mass spectroscopy (GC-MS), Molecular docking.

NSBMB/UPH/NB/082

Proximate and Heavy Metal Concentrations on Locally Processed Cassava Food (Abacha) in Selected Markets Obtained from February to March to May, 2024 in Yenagoa Bayelsa State

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ABSTRACT

This evaluation analyzed the proximate and heavy metal compositions of locally processed cassava food product (Abacha) in selected markets in Yenagoa. The Abacha used for this study was purchased from Tombia, Opolo, Swali, and Azikoro markets. Proximate and heavy metal were determined carried based on standard methods. The ash, moisture, rude lipid, crude fiber, and carbohydrate of Abacha obtained from Tombia market for week 3 were 2.01±0.15%, 3.16±0.11%, 3.82±0.03%, 3.51±0.023%, and 86.59±2.11% respectively. The ash, moisture, rude lipid, crude fiber, and carbohydrate of Abacha obtained from Swali market were 3.71±0.10%, 3.31±1.03% 3.25±0.20%, 3.84±0.16%, and 85.08±0.59% respectively. The Pb, Cr, Cd, an Hg levels in Abacha purchased from Tombia market for week 3 were 2.10±0.10%, 2.05±0.02%, 2.07±0.02%, and 2.10±0.00% respectively. The Pb, Cr, Cd, an Hg levels in Abacha purchased from Swali market for week 3 were 2.14±0.02%, 2.17±0.21%, 2.11±0.30%, and 2.17±0.02% respectively. The carbohydrate content in Abacha purchased from Opolo market was highest followed by Swale market, Azikoro market while the least was Tombia market. The Pb, Cr, Cd, and Hg observed in Abacha from Tombia and Swali markets were within the reference daily intake values for both women and men. There should be profound control of inorganic mineral concentration of locally processed food in Yenagoa, Bayelsa from time to time in order to thwart the incidence of metal-induce toxicity, resulting from consumption of food loaded with pollutant by the public.

Keywords: Abacha, cassava product, processed food, proximate parameters, heavy metals, Yenagoa markets

NSBMB/UPH/NB/083

Assessment of Enteric Pathogens Isolated and Antimicrobial Susceptibility From Palm Wine Sold by Vendors in Otukpo Metropolis, Benue State

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ABSTRACT

Palm wine is an alcoholic beverage created from the sap of various species of palm tree, this study aimed at accessing the Enteric Pathogens and Antimicrobial Susceptibility from Palm Wine sold by vendors in Otukpo Metropolis, Benue State, focusing on different locations. One hundred and sixty (160) samples were collected from four randomly selected vendors at different spots (Akpa Street-Vendor A, Ibadan Street- Vendor B, Entina Village- Vendor C and Beside Otukpo main market- Vendor D). Bacterial isolates were identified, and their antimicrobial load and susceptibility was determined. Results of each sample was accurately recorded against each area of study. Data were analysed and presented using Descriptive statistics, Microsoft excel was used while One-Way ANOVA at 95% level of confidence ($P \leq 0.05$) and graphing, were performed using Origin Lab (22.0 Pro) software. From the results four different bacterial contaminants were isolated from palm wine sold by vendors across points in Otukpo metropolis. They include: *Salmonella spp, E. coli*, *Staphylococci* and *Pseudomonas,* Akpa Street had 1.50±0.707, 5.50±0.707, 1.00±0.707, and 1.00±0.000 respectively, Ibadan Street had 0.00±0.000, 1.50±0.707, 0.00±0.000, and 0.00±0.000 respectively, Entina village had 0.00±0.000, 1.50±0.707, 0.00±0.000 and 0.00±0.000 respectively, Otukpo main market had 0.00 ± 0.000^{b}, 5.50±0.701, 0.00 ± 0.000^{b}, and 0.00 ± 0.000^{b} respectively, Value with different superscript within the same column were considered significantly different at ($P>0.05$). Across the studied locations, *E. coli was* more prominent in recurrence compared to *salmonella, Staphylococci* and *Pseudomonas* in Akpa Street. A trend that was maintained across other studied locations, i.e., Ibadan Street, Entina village, and Otukpo main market. The mean value of bacterial isolates in Apka Street, Ibadan Street, Entina village and Otukpo main market were 9.00±12.728, 1.50±2.121, 1.50±2.121 and 5.50±7.778 respectively. Result of Akpa street had the highest level of bacterial contaminations and were significantly higher ($P>0.05$). The presence of these organisms in the wine could be an indication of the poor hygienic state of the tappers, materials used and the method of tapping involved. This occurrence is of public health importance as the wine is consumed in almost every part of the country due to its nutritional, health and social significance. From this study

it is concluded that there should be need for enlightenment campaign covering palm wine vendors on best practices and it's important to identify good environment devoid of high microbial loads.

Keywords: Palm wine, vendors, enteric pathogens, antimicrobial susceptibility

NSBMB/UPH/NB/084

Nutritional Evaluation of African Walnut (*Tetracarpidium Conophorum)*

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ABSTRACT

The nutritional evaluation of African walnuts was determined using standard methods of analysis. The chemical composition of the samples was determined according to the procedure outlined by the Association of Official Analytical Chemists (AOAC, 2000). The uncooked and cooked samples were found to have a mean moisture content of 8.32% and 8.07% respectively. The mean fat content was found to be 42.74% and 41.53% for uncooked and cooked samples respectively. The low carbohydrate content of 12.38 and 9.56% for uncooked and cooked samples respectively, shows that African walnut is not a primary source of carbohydrates. The samples of African walnuts were found to contain both essential and non-essential amino acids, the highest content being that glutamic acids with mean values of 12.04 and 12.59 per 100g for uncooked and cooked samples respectively. The nuts were found to have high values of aspartic acids which helps in the synthesis of other amino acids like arginine, lysine, asparagine, threonine, isoleucine, etc during the citric acid cycle. The nuts have high values of glutamic acid which is critical for healthy brain development. The highest amount of fatty acid present in both uncooked and cooked samples of African walnut is 9,12,15-octadecatrienoic acid, ethylester, having 79.9% area in the uncooked samples and 80.15% area in the cooked sample. This shows that African walnut is a good source of polyunsaturated fats. Further research is recommended to show how African walnut could be used to lower bad cholesterol in the blood thereby lowering the risk of heart disease and stroke.

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Quality Evaluation of Cake Produced From Palm Kernel (*Elaeis Guineensis*) Oil and the Effect of the Oil in Wistar Albino Rats

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ABSTRACT

This study was undertaken to determine the nutrient potential, physicochemical properties and sensory attribute of cake made from oil extracted from palm kernel oil (*Elaeis Guineensis*) and the effect of the oil on Wistar rats during acute toxicity assay.Palm kernel oil was extracted using Mechanical Oil Press Machine. Lipid profiles, proximate analyses of the oil and cake, sensory evaluation of the cake, Physiochemical parameters, lipid profiles, hematological and histopathological studies were carried out using standard procedures.The lipid profiles of the palm kernel oil shows the fatty acids compositions. The proximate composition of the extracted oil are as follows: fat (43.46±0.02%), crude protein (35.61±0.03%), moisture content (4.71±0.001%), carbohydrate (1.84±0.002%), crude fibre (3.50±0.001%) and ash content (2.04±0.002%) respectively. The color, pH, specific gravity, refractive index, acid value, iodine value, peroxide value, percentage free fatty acid and saponification value of the oil were: golden yellow, 6.84, 0.97±0.001 kg/dm^3, 1.4714, 4.27 ± 0.28 (Mg KOH/g), 16.03 ± 0.89 (g I_2/100g), 5.145 ± 0.065(Meq/kg), 2.14 ± 0.21 (%) and 239.10 ± 3.02(mgKOH/g) respectively. The sensory evaluation of the cake indicates that the cake is overall acceptable. The lipid profiles, hematological and histopathological studies showed that the oil does not have bad side effects on the animals during acute toxicity study.The study shows that the palm kernel oil is good for human consumption and is not toxic to the experimental animals used in the study.
Keywords: Palm kernel oil (*Elaeis Guineensis*), cake, sensory evaluation, animal study, and Biochemical studies.

NSBMB/UPH/NB/086

Physicochemical Analysis of Water Stored in a Freshly Used Emulsion Paint Container and its Effects on Hepatocellular Functions of Albino Rats

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ABSTRACT

The physicochemical analysis of water stored in a freshly used emulsion paint container, and its effect on the liver function of Wistar Rats was studied. Eight healthy Albino rats of both sexes were randomly assigned into two (2) groups of test and control. The control group was

fed with normal feed and water whilst the test group was fed with normal feed and the test water sample stored in a freshly used emulsion paint container. Results showed that serum hepatic biomarkers, including Aspartate Amino Transferase (AST), Alanine Amino Transferase (ALT) and Alkaline Phosphatase (ALP) were significantly ($p<0.05$) increased (AST-18.15±492mg/dL, ALT-17.25±2.23mg/dL, ALP-153.0± 10.677mg/dL), when compared to that of control (AST-9.25 ±2.22mg/dL, ALT-9.5±1.29mg/dL, ALP-103.25±7.13mg/dL) respectively. However, the result for bilirubin showed no alteration in both test (10.5±1.08mg/dL) and control (10.5±1.08mg/dL). There was no significant ($p<0.05$) difference in the Haematological parameters which included PCV (44.25±6.23%), platelet (199.0±126.21%), WBC (6.92±3.610%), HB (14.12±1.93%) for test group, except RBC (7.57±66), which was significantly high when compared to control with mean values of 38.0±3.74%, 103.50±32.64%, 3.40±2.03%, 12.15±1.67% and 5.75±0.96% respectively. The mean levels of Differential was significantly ($P<0.05$) high for lymphocyte, (76.25±2.21%) in the test group when compared to control (68.25+2.75%). Similarly, the result was significantly ($p>0.05$) low for neutrophil (15.0±2.16%), Eosinophil (4.5±0.58%) and monocyte, (4.25±0.50%) in test group when compared to control (21.75±1.708%), (6.50±2.31%) and (3.50±1.29%) respectively. Physicochemical parameters of water sample which include, Taste, Conductivity, TDS, TSS, turbidity, Chloride, Odour, BOD, COD, Sulphate, Iron, Lead, Cadmium, gave result which complied with WHO permissible levels, except pH (5.89) and Zinc (1.27ppm). Histopathological examination of test organism showed significant ($p<0.05$) hepatotoxicity characterization such as distortion of lobular architecture, vascular/sinusoidal congestion, diffuse and patchy collection of mononuclear inflammatory cells infiltration. The findings suggest the onset of damage to hepatic cells. It is thus recommended that water stored in containers originally used for storing industrial substances like paint, be used with caution.

Keywords: Physicochemical analysis, Liver function, Emulsion paint container, Histopathology

NSBMB/UPH/NB/087

Determination Of Nutriphytochemical Constituents, Biological Activities And Toxicity Of *Nauclea Latifolia*

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ABSTRACT

Nauclea latifolia, a medicinal plant indigenous to Africa and Asia, has been traditionally used for its therapeutic properties. This study investigates its nutriphytochemical constituents, biological activities (including antidiabetic, antimalarial, antioxidant, anti-inflammatory, and antibacterial properties), and toxicity using standard methods. Results indicate that the root and leaf extracts of *N. latifolia* are rich in moisture, ash, crude fat, crude fibre, crude protein, carbohydrates, and vitamins A, C, D, and E, as well as various minerals. Qualitative

phytochemical screening confirms the presence of numerous bioactive compounds. The ethanol extract exhibits significant quantities of phenolics, flavonoids, alkaloids, tannins, and saponins. Both ethyl acetate and ethanol extracts demonstrate potent antimalarial, antibacterial, and antifungal activities. Ethyl acetate extract shows superior antioxidant and anti-diabetic activities, while the ethanol extract performs better in terms of anti-inflammatory efficacy. Toxicological evaluation reveals no signs of toxicity up to an acute maximum dose of 10 g/kg, with some changes observed in hematological parameters and histology at higher doses. *N. latifolia* shows promise as a safe and effective source of nutraceuticals, particularly in combating malaria and associated conditions, inflammation, oxidative stress, microbial infections, and diabetes.

NSBMB/UPH/NB/088

Effects of Bean Cake Cooked in Different Packaging Materials on Lipid Profile and Liver Function of Wistar Albino Rats

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ABSTRACT

Cooking can trigger numerous physical and chemical changes in food, particularly when it is packaged before the process begins. The packaging materials used for cooking bean cake are composed of various chemicals. During cooking, these chemicals can migrate into the bean cake, leading to potential chemical contamination. This research assessed the effect of bean cake cooked in different packaging materials (Thaumococcus danielle leaf, aluminum foil and plastic plate) on the lipid profile and liver function of Wistar rats. Twenty-five Wistar rats were grouped into five (5 rats per group). Group one was fed Cerelac, group two received commercial rat feed, group three was given bean cake packaged in T. danielli leaf, group four had bean cake packaged in aluminum foil, and group five was given bean cake packaged in a plastic plate. All groups were fed ad libitum for twenty-eight days. There was no significant difference in the liver function and lipid profiles observed between the control groups and the test groups. The results showed that the packaging materials did not significantly affect the lipid profile and liver function of Wistar rats over the 28-day period. However, bean cake packaged in plastic retained more nutrients compared to other packaging materials.

keywords: Bean cake (moi-moi), packaging materials, lipid profile, liver function, wistar albino rats.

NSBMB/UPH/NB/089

Dietary Pattern of Manual Stone Crushers in North Central Nigeria

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ABSTRACT

Manual stone crushers, a marginalized occupational group, face significant nutritional challenges that could impact their overall health, work efficiency, and well-being. This is particularly alarming as manual stone crushers engage in physically demanding work, necessitating a balanced and nutritious diet to support their labour-intensive tasks. A cross-sectional study was conducted among manual stone crushers working within the North-central region of Nigeria to investigate the dietary patterns focusing on the consumption frequency of different food groups. Workers were selected using a multistage sampling technique with 151 participants. The results showed that majority consume cereals and grains, with 28.5% consuming three types and only 14.6% not consuming any. Consumption of roots and tubers is also fairly common, with 21.2% consuming two types, but 22.5% do not consume any. For legumes and nuts, a significant number (35.1%) do not consume them, while consumption of one to two types is more common among others. Meat and poultry consumption shows a varied pattern, with 18.5% consuming four or five types each, and 21.2% not consuming any. A large portion (43.7%) do not consume milk products, while 27.2% consume one type. Fruit and vegetable consumption shows a high variety, with 17.9% not consuming any and 40.4% consuming one to five types. The majority consume one to two types of fats and oils, with 38.4% consuming two types and 20.5% not consuming any. For sweets, a significant number (43.7%) do not consume them, while 33.1% consume one type. Lastly, a large majority (74.8%) do not consume alcohol. It can be concluded based on the results of this study that a significant reliance on cereals and grains, fats and oils, sugary sweets which provide high energy for their type of work, with a notable low intakes of milk and milk products, meat and poultry intake which could impact their overall health and work efficiency negatively. This highlights the need for targeted nutritional awareness and interventions to address the dietary gaps and improve the health and well-being of this marginalized low-income population.

Keywords: Dietary Pattern, Manual Stone Crushers

NSBMB/UPH/NB/090

Dietary Pattern of Manual Stone Crushers in North Central Nigeria

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ABSTRACT

Manual stone crushers, a marginalized occupational group, face significant nutritional challenges that could impact their overall health, work efficiency, and well-being. This is particularly alarming as manual stone crushers engage in physically demanding work, necessitating a balanced and nutritious diet to support their labour-intensive tasks. A cross-sectional study was conducted among manual stone crushers working within the North-central region of Nigeria to investigate the dietary patterns focusing on the consumption frequency of different food groups. Workers were selected using a multistage sampling technique with 151 participants. The results showed that majority consume cereals and grains, with 28.5% consuming three types and only 14.6% not consuming any. Consumption of roots and tubers is also fairly common, with 21.2% consuming two types, but 22.5% do not consume any. For legumes and nuts, a significant number (35.1%) do not consume them, while consumption of one to two types is more common among others. Meat and poultry consumption shows a varied pattern, with 18.5% consuming four or five types each, and 21.2% not consuming any. A large portion (43.7%) do not consume milk products, while 27.2% consume one type. Fruit and vegetable consumption shows a high variety, with 17.9% not consuming any and 40.4% consuming one to five types. The majority consume one to two types of fats and oils, with 38.4% consuming two types and 20.5% not consuming any. For sweets, a significant number (43.7%) do not consume them, while 33.1% consume one type. Lastly, a large majority (74.8%) do not consume alcohol. It can be concluded based on the results of this study that a significant reliance on cereals and grains, fats and oils, sugary sweets which provide high energy for their type of work, with a notable low intakes of milk and milk products, meat and poultry intake which could impact their overall health and work efficiency negatively. This highlights the need for targeted nutritional awareness and interventions to address the dietary gaps and improve the health and well-being of this marginalized low-income population.

Keywords: Dietary Pattern, Manual Stone Crushers

SUB-THEME 3
ENVIRONMENTAL BIOCHEMISTRY

NSBMB/UPH/EB/001

The Assessment of the Concentrations of Selected Metals and Polycyclic Hydrocarbons in Fresh and Fried Bayelsa Suya (Orycytes Rhinoceros) in Bayelsa State, Nigeria.

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ABSTRACT

Oryctes rhinoceros larvae is a special cuisine heavily patronized in Bayelsa and neighboring states of Delta and Rivers. It is popularly known as Bayelsa Suya and is prepared for consumption mainly in fried form. The preparation mode and exposure during sales call for empirical investigation into its chemical and toxicological states. Heavy metals and polycyclic hydrocarbons (PCHs) were the major bioactive substances analyzed in fresh and fried (prepared) forms. The heavy and trace metals analyzed included lead (Pb), arsenic (As), cadmium (Cd), chromium (Cr), manganese (Mn), iron (Fe), mercury (Hg), nickel (Ni), zinc (Zn), and copper (Cu). The metals were analyzed using AAS, whereas PCH was analyzed using GC-MS. Student *t*-test was used to compare the concentrations of the heavy metals and PCH between the fresh and fried Bayelsa Suya. The results indicated that the fried form contained higher concentrations ($p<0.05$) of heavy and trace metals, except for manganese which was higher in the fresh form. In a similar vein, PCH species such as naphthalene, acenaphthylene, acenapthene, fluorene, fluoranthrene, pyrene, benz{b}fluoranthrene, benzo(a)fluoranthrene, and benzo(a)pyrene were significantly increased ($p<0.05$) in the fried when compared to the fresh. The increase observed in some of the metals and PCH could be associated with the preparatory stage, and sales exposure. The findings of this study underscore the importance of considering the potential health risks of heavy metals and PCH intoxicates associated with a lot of diseases. This could be minimized by stringent government policies on food hygiene and public awareness of the ills of consuming food contaminated with heavy metals and PCHs.

Keywords: *Oryctes rhinoceros*, Bayelsa suya, metals, polycyclic hydrocarbons

NSBMB/UPH/EB/002

Total Hydrocarbon Content, Selected Heavy Metals Concentrations And Some Fatty Acid Profile of *Irvinga Gabonensis* (Ogbono) Seed Oil

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ABSTRACT

The African Bush Mango (*Irvingia gabonensis*), grows naturally within the forest region of parts of Africa, extending through Senegal in the west to the Sudan up north and Angola in the southern region. The study was aimed at investigating the total hydrocarbon content (THC), fatty acid profile and heavy metals level in seed oil. The *Irvingia gabonensis* (*I. gabonensis*) seeds oil was extracted using a seed-to-oil extraction machine (automated) which was then

analyzed. The total hydrocarbon content was found to be 0.00825 ± 0.0001 mg/kg. Atomic absorption spectrophotometer (AAS) was used to identify various active compounds present in the seeds oil. Pennogenin diacetate, propanamide and oleic acid among others. In summary, the *I. gabonensis* seeds oil was found to. contain low level of carbon impurities and rich in both unsaturated and saturated fatty acids and may be useful for drug design and industrial purposes.

Key words: *Gabonensis*, heavy metals, penogenin, hydrocarbon, fatty acid.

NSBMB/UPH/EB/003

Potential Human Health Risk Assessment and Evaluation of Heavy Metals Contamination in Seafood from River Niger Across Ndoni Town in Onelga, Rivers State

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ABSTRACT

Anthropogenic Sources tend to elevate level of heavy metals in the water bodies. The seafood bio accumulates these metals often times within their body system. This study evaluated the quantities of Lead (Pb), Cadmium (Cd), Chromium (Cr), Nickel (Ni), Copper (Cu), Iron (Fe), Zinc (Zn) and Mn from seafood specifically Periwinkle, Shrimp and Crab obtained from River Niger across Ndoni town in Rivers State. The result obtained was employed in assessing the human health risk. Ninety six samples comprising of Periwinkle, Shrimp and Crab were digested and tested using Flame (F-AAS).The result reflected that the levels of Pb, Cd, Cr, Ni, Cu, Fe, Zn, and Mn ranged from 0.040 ± 0.002to 0.817 ± 0.001 mg/kg; 0.002 ± 0.001 to 0.064 ± 0.001 mg/kg; 0.386 ± 0.005 to 3.422 ± 0.011 mg/kg; 0.670 ± 0.008 to 4.760 ± 0.015 mg/kg; 2.154 ± 0.003 to 9.108 ± 0.003 mg/kg; 5.120 ± 0.012 to 512.31 ± 0.006 mg/kg; 6.137 ± 0.009 to 18.337 ± 0.020 mg/kg; and 2.476 ± 0.029 to 8.322 ± 0.026 mg/kg correspondingly. The concentration of Cr surpassed the permissible values. The results of the human health risk assessment pointed out that it is safe and free from non-carcinogenic carcinogenic risks. However, Cr should be checked to prevent impending health risk from its accumulation in the body.

Keywords: Heavy Metals; Seafood; Potential; Health; Risk Assessment; Ndoni

NSBMB/UPH/EB/004

Health Risk Assessment of Polycyclic Aromatic Hydrocarbons And Heavy Metals in *Oreochromis Niloticus* and Water Collected from Amadi-Ama Creek, Rivers State, Nigeria.

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ABSTRACT

Polycyclic aromatic hydrocarbons (PAHs) and heavy metals are common pollutants in the aquatic environment. This study assessed the levels of 16 compulsory PAHs and heavy metals comprising of lead (Pb), nickel (Ni), copper (Cu), zinc (Zn), mercury (Hg) and chromium (Cr) in *Oreochromis niloticus* and water, collected from Amadi-Ama creek, in Rivers State. Samples were analyzed for PAHs and heavy metals using atomic absorption spectrometry (AAS) and High Pressure Liquid Chromatography (HPLC) respectively. The results showed that the fish samples contained high levels of PAHs and the most critical pollutant was benzo[a]pyrene (BaP). There were slight variations amongst PAH congeners. Phenanthrene contributed the highest percentage (57 %) in the composition profile. The concentration of Pb, Cu and Cr in fish and water samples exceeded the maximum permissible limit of 0.3, 30 and 0.5 mg/kg and 0.5, 30 and 0.5 mg/kg recommended by WHO and FMEnv respectively. The estimated daily intake (EDI) and chronic daily intake via ingestion and dermal (CDIing) and (CDIder), hazard quotient (HQ), hazard index (HI) of metals in fish and water were within the oral reference dose (RfD) and permissible standard of metals. However, the carcinogenic risk (CRing and CRder) of heavy metals in water via ingestion and dermal routes of water exceeded the permissible standard which is indicative that there may be carcinogenic risk posed to the exposed populace as a result of the intake of metals via direct or indirect water consumption.

Keywords: Heavy metals; polycyclic aromatic hydrocarbon; health risk assessment; *Oreochromis niloticus*; Water.

NSBMB/UPH/EB/005

Reducing Harmful PAHs with Heat-Stable Biocatalytic Remediation Cocktails from Crude Oil Polluted Soil

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ABSRTACT

This research investigated the potential of Heat-Stable Biocatalytic Remediation Cocktails (HBRC) to reduce carcinogenic, mutagenic, and teratogenic polycyclic aromatic hydrocarbons

(PAHs) in crude oil polluted soil. The PAHs studied included benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, indeno[1,2,3-cd]pyrene, benzo(g,h,i)perylene, and naphthalene. Crude oil polluted soil was obtained from Agbura community, Yenagoa, Bayelsa State. The experiment, conducted at the Center for Ecological Garden, University of Port Harcourt, lasted for 180 days. HBRC was produced from brown Sugar and fruit peels including pineapple (*Ananas comosus*), plantain (*Musa paradisiaca*), orange (*Citrus reticulata*), banana (*Musa acuminata*), and watermelon (*Citrullus lanatus*) in a 1:1:1:1:1 ratio, with water added in a 1:3:10 ratio. The mixture was fermented for 90 days (3 months) and then filtered. Six experimental groups were set up: Groups 1 and 2 contained 2 kg each of unpolluted and polluted soil samples, respectively. Groups 3 and 5 were treated with 250 ml and 500 ml of HBRC/kg (single application), while Groups 4 and 6 received 250 ml and 500 ml of HBRC/kg monthly. Soil PAH analysis was conducted using standard methods. Results showed that HBRC reduced carcinogenic PAHs by 24.00%, 88.43%, 76.17%, 89.29%, and 70.67% in Groups 2 to 6, respectively. Mutagenic PAHs were reduced by 25.87%, 89.69%, 76.47%, 91.38%, and 72.66%, while teratogenic PAHs were reduced by 23.60%, 77.55%, 73.59%, 72.92%, and 77.37%, respectively. These results indicate that HBRC is effective in reducing carcinogenic, mutagenic, and teratogenic PAHs in crude oil polluted soil.

Keywords: Carcinogenic, Mutagenic, Teratogenic, Polycyclic Aromatic Hydrocarbon, Bioremediation, Soil Pollution.

NSBMB/UPH/EB/006

Assessment of Indoor and Outdoor Background Ionizing Radiation Levels at Federal Polytechnic Daura Take-Off Site

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ABSTRACT

Nuclear radiation detector (gc-01) was used to carry out the assessment of indoor and outdoor background ionizing radiation levels in selected areas of federal polytechnic daura, katsina state, nigeria take-off site. A total of fourteen (14) areas were surveyed and the result obtained showed that the annual indoor values were highly significant at microfinance unit 2.803±0.09 msv/yr and computer lab 2.523±0.07 msv/yr and lowest at library 1.822±0.07 msv/yr and lh1 2.523±0.07 msv/yr. For the outdoors areas, microfinance unit recorded the highest ionizing radiation value of 0.631±0.02 msv/yr while biology lab has the lowest value of 0.438±0.02 msv/yr. On the basis of the aforementioned findings, it was deduced that the outdoor ionizing radiation levels in all the selected areas is within the worldwide set limit, while indoor ionizing radiation level in all the surveyed areas is within the safety established limit except for microfinance unit and biology lab which showed average annual effective dose higher than the worldwide annual effective dose of 2.4 msv/yr as stipulated by unscear and therefore crucial

measures should be taken to reduce and control the background ionizing radiation level in these areas for the safety of staff and students who are always interacting with environment.

Key words: Annual effective dose, gc-01 detector, ionizing radiation, indoor level, outdoor level

NSBMB/UPH/EB/007

Human and Ecological Health Risk Assessment of Heavy Metals Contamination in Soil from Selected Communities in Omoku, Rivers State, Nigeria

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ABSTRACT

Man-made activities such as crude oil exploration and exploitation tend to elevate the metals levels in the environment. This study was carried out in order to determine the concentration of Pb, Cd, Cr, Ni, Fe and Cu in the soil from five selected communities in Ogba/Egbema/Ndoni Local Government Area in Rivers State, Nigeria. Heavy metal analyses was carried out using Atomic Absorption Spectrophotometer (AAS). The concentration of Pb, Cd, Cr, Ni, Fe and Cu ranged from 0.037 ± 0.001 to 0.122 ± 0.001; 0.013 ± 0.001 to 0.039 ± 0.001; 1.132 ± 0.001 to 7.001 ± 0.001; 1.113 ± 0.001 to 890.423 ± 0.001; 1.732 ± 0.001 to 4.912 ± 0.001 and 2.003 ± 0.001 to 6.005 ± 0.001 mg/kg respectively. Ecological and human health risk assessment was carried out to ascertain the health impact of the heavy metals to the exposed population. All metals analyzed were within the permissible limit prescribed by United State Environmental Protection Agency. The ecological health risk assessment implicated Fe as a major source of extreme contamination and pollution which may cause health risk to the exposed populations. Human health risk assessment showed that the average daily dose (ADD) and Average Daily Intake (ADI) were within the reference dose which indicated low or no accumulation of the metals in the body system. The Hazard Quotient (HQ) and hazard index (HI) were less than 1 while the carcinogenic risk (CR) and total carcinogenic risk (TCR) were within the predicted permissible range for carcinogens, an indication that there may not be health risk to the exposed population.

Keywords: Ecological; Human; Heavy metals; Soil; Health; Risk; Assessment; Omoku

NSBMB/UPH/EB/008

Nickel-Cadmium Contamination of Drinking Water Mediated Possible Health Risks in Albino Rats: A Study on Chronic Exposure

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ABSTRACT

In this study, the continuous intake of nickel (Ni) and cadmium (Cd) through the contamination of drinking water by albino rats was initiated to ascertain the possible health concerns at contrasting exposures. The study employed Box-Behnken design (BBD) with the consideration of three experimental factors, such as Cd level at dose range of 50 to 150 mg/L, Ni level at a dose range of 50 to 150 mg/L and duration of exposure from 20 to 60 days using thirty-four male albino rats. The contamination of drinking water by these contaminants at one alpha level, and the responses, specifically blood glucose level BGL), atherogenic index of plasma (AIP), cardiac risk ratio (CRR), and atherogenic coefficient (AC) at optimized conditions were monitored. The mean values of responses generated regression models, which differed significantly at $p<0.05$ with characteristics of r^2 value above 95% and lack of fit not markedly different ($p>0.05$) respectively. The results further showed marked increase ($p<0.05$) in BGL, AIP, CRR and AC, as occasioned by the synergistic effects of the contaminants at optimized conditions. The findings of this study strongly suggested the possible risks of some metabolic disorders such as diabetes mellitus, atherosclerosis and obesity in the susceptible rats at chronic exposure.

Keywords: Cadmium, contaminants, drinking water, metabolic disorders, nickel,

NSBMB/UPH/EB/009

Comparative Analysis of Heavy Metals in Soil By AAS and ICP-OES

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ABSTRACT

The distribution and ecological risks owing to toxic metals in topsoil of an open dumpsite was determined. Concentrations of heavy metals were initially screened using an Atomic Absorption Spectroscopy (AAS) prior to confirmation on an Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES). The contents of As, Ca, Cd, Co, Cr, Cu, Fe, K, Mn, Na, Ni, Pb and Zn in dumpsite soil was determined respectively (EPA Method 3050B, EPA Method 200.7). The results revealed that ICP-OES exhibited a higher precision than AAS whilst measuring the concentration of all elements except for chromium. The mean concentrations of soil metals via AAS to ICP-OES were in the order Arsenic (0.000 : 1.5033 mg/kg), Cadmium (0.000 : 2.045 mg/kg), Chromium (33.003 : 24.423 mg/kg), Copper (28.223 : 66.289 mg/kg), Iron (1,408.753 : 8,126.040 mg/kg), lead (0.000 : 37.811 mg/kg), manganese (1,356.167 : 1,631.550 mg/kg), nickel (0.000 : 11.338 mg/kg) and Zinc (146.957 : 768.302 mg/kg). Physicochemical and Cation Exchangeable Capacity (CEC) assessment revealed pH

(7.52), Electrical Conductivity (90.34 us/cm), SO_4^{2-} (250.747 mg/kg), NO_3^- (6.114 mg/kg), N (0.3%), Calcium (5,029.047 mg/kg), Potassium (1,719.603 mg/kg) and Sodium (857.428 mg/kg). Contamination factor (CF) suggested that the soils were considerably contaminated ($3 \leq CF < 6$) with Zn, moderately contaminated ($1 \leq CF < 3$) with As, Cd and Cu but least contaminated (CF<1) with Ni, Fe, Mn, Pb and Cr. The degree of potential ecological risk index (PERI) revealed that the distribution of Cadmium exhibited moderate risk; 61, while all other tested heavy metals displayed low risk PERI< 40. Geo-statistical analyses geo-accumulation suggested moderate to strong contamination due to Cd (Igeo 2.18) and Zn (Igeo 2.43), derived from anthropogenic activities whereas geological and atmospheric depositions accounted for the presence of all other tested metals.

Keywords: AAS, ICP-OES, Geo-accumulation, Contamination Factor, PERI

NSBMB/UPH/EB/010

Qualitative Survey of Fungi in Three River Niger Banks in Kogi State

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ABSTRACT
Water is essential to life, but 29 percent of the global population lacks a safely managed drinking water supply (SDG 6). Many diseases arise from waterborne bacterial infections that lead to deaths. The mycological study of the river Niger was carried out to isolate and identify fungi associated with water contamination. Water samples were collected along the river from Lokoja, Idah and Itobe in Kogi state. Culture media (Potato Dextrose Agar) were prepared and sterilized. The inoculated Petri dishes were incubated at room temperature (27oC) for 5 days. 97 Colonies of fungi were observed. Sub-cultures were made subsequently to obtain a pure culture of the fungi mycoflora.Physiological 1dentification of fungi isolates was done using lacto-phenol blue compound mounted on microscope at different magnifications of x10Four pure isolates were gotten from the water samples: *Aspergillus niger, Rhizopus nigrican, Penicillium chrysogenum,* and *Alternaria alternates* which are reported to be harmful to man's health. The predominant fungi genera in all samples are Aspergillus and Rhizopus species. This survey of aquatic fungi in the river revealed a great diversity of fungal genera. This revealed that fungus in water supports the paradigm that their presence and relative abundance are a result of contamination of the water body due to the entry of sewage and waste dumps from the catchment areas. The presence of this pathogenic species indicates the threat posed by these organisms and their spores to the safety of humans and makes the water dangerous for aquatic life, and domestic and economic use.

Keywords: Water pollution, Disease, Pathogen, Fungi isolation, Physiological identification and Culture

NSBMB/UPH/EB/011

Isolation and Molecular Characterization of Bacteria from Mbororo Stream Water Michika, Adamawa State

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ABSTRACT

Water is essential to life, but many people do not have access to clean and safe drinking water and many die of waterborne bacterial infections. The current study was carried out to isolate and identify some of the bacteria associated with stream water in Mbororo. The total bacterial viable count was determined, ranged from $2.9x10^5$-$4x10^5$ cfu/mL. Different selective media was used. Four (4) isolates were identified by morphological characteristics and biochemical reaction which are Comamonas Testosteroni, Comamonas Sp, Proteus Mirabilis and Pseudomonas Sp. the 4 isolates will be subject to sequencing of 16s rRNA. The analysis of sequence of 16s rRNA gene using universal primer for similarity search (BLAST) is a similarity search program that can be used via a web interface by comparing database of sequences with nucleotide stored in (NCBI) e.g. GenBank. Followed by phylogenetic trees which shows an illustration of the evolutionary relationships between groups of organism. This is done by when 2 sequences found in 2 organisms are very similar, we assume that they have been derived from one ancestor.

Keywords: Molecular characterization, bacteria, stream water, biochemical test, sequencing, phylogenetic tree

NSBMB/UPH/EB/012

Characterization of Waste Biomass and Resource Generation from Oil Palm Mill Waste in Okada.

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ABSTRACT

Environmental pollution caused by increased agricultural activities and processes is a problem of global concern. Oil palm is widely grown in Okada for food but its cultivation and processing lead to the accumulation of various oil palm waste (palm kernel shell; PKS, oil palm empty fruit bunch; EFB, pressed fruit fibre or mesocarp fibre; MF, oil palm trunks; OPT, oil palm leaves; OPL, and palm oil mill effluent; POME). This important source of livelihood for the Okada people is presently posing as an environmental nuisance, destroying agricultural land and having an effect on soil and climate owing to poor waste management practices. This study investigates some waste streams from four different mills for polyaromatic hydrocarbon concentration by gas chromatographic methods, Phytochemical, proximate, and elemental analyses were also analysed in the various oil palm mill waste samples to authenticate the percentage concentrations of various metabolites. Results show that the waste component contained nutrients and various phytochemicals including fat, fibre, protein, alkaloids,

saponins, flavonoids, tannins, , terpenoids, anthraquinones, coumarin and cardiac glycosides etc. Ongoing investigation is on the generation of biomaterials from these waste streams. There was a clear indication that these waste products are rich sources of biomaterials and their transition into other value-added materials will reduce greenhouse formation and regulate environmental pollution while aiding bioeconomy. This research project aligns with SDG 1,2,3 and 13 of the 17 UN Sustainable Developmental goals.

Key words: Oil Palm Mills, Environmental Pollution, Value Addition, Bioeconomy.

NSBMB/UPH/EB/013

Evaluation of Heavy Metals Concentrations in Coastal Area of Mbo LGA, Akwa Ibom State

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ABSTRACT

The study assessed heavy metal concentrations in surface water samples from coastal areas of Mbo LGA, Akwa Ibom State, due to anthropogenic activities posing health risks to aquatic life and humans. Ten sampling sites were randomly selected across the region, with samples collected from streams and rivers during dry and wet seasons. GPS coordinates were recorded, and atomic absorption spectroscopy analyzed eight heavy metals. Results were compared with WHO permissible levels. Cadmium levels exceeded WHO limits, ranging from 0.58-0.96 mg/dl (dry season) and 0.008-0.082 mg/dl (wet season). Zinc ranged from 0.208-0.461 mg/dl (dry) and 0.204-0.460 mg/dl (wet). Lead was between >0.001-0.018 mg/dl (dry) and >0.001-0.014 mg/dl (wet). Manganese varied from >0.001-0.849 mg/dl (dry) to >0.001-1.412 mg/dl (wet). Iron ranged from 0.148-2.425 mg/dl (dry) to 0.142-2.42 mg/dl (wet). Cadmium, zinc, manganese, iron, and nickel levels surpassed WHO standards, with lead exceeding in two sampling points. Cobalt and copper were below WHO levels. In conclusion, the study revealed elevated concentrations of cadmium, manganese, zinc, iron, and nickel in coastal water samples, posing health risks to residents relying on these sources. Further research is needed to comprehensively assess water quality and mitigate pollution impact.

Keywords: Heavy metals, Surface water, Anthropogenic activities

NSBMB/UPH/EB/014

A Statistical Model for Determining the Impact of Air Pollution on Socio-Economic Well Being and Public Safety of Residents in Gas Flaring Communities in Delta State, Nigeria.

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ABSTRACT

Gas flaring is a common practice in oil producing communities in Delta State. This study was designed to develop a statistical model with the aim to assess the impact of air pollution on the socio-economic well-being and public health of affected selected communities in gas flaring areas in Delta State. The sampled communities were selected based on their proximity to gas flaring sites and demographic diversity. Air quality (NOx, SO_2, VOCs and PM) and socio-economic (employment, levels of income, and education) data were obtained from field monitoring stations and household surveys respectively while health data (cardiovascular/respiratory diseases, and birth outcomes) were from community health surveys and local healthcare facilities. GIS data assessed the proximity of the communities to gas flaring sites and a multivariate statistical model that considered these various independent variables in order to predict the dependent variables (disease prevalence and income levels) was employed. Multiple regression analysis was used to quantify the relationships between these variables and the effects of gas flaring. The study revealed a strong association between air pollution from gas flaring and adverse health outcomes in the affected communities. Higher levels of air pollutants significantly correlated with increased rates of cardiovascular diseases, respiratory diseases, and low birth weights This was a significant concern as pollutants measured exceeded the World Health Organization guideline and the concentration of $PM_{2.5}$ was particularly alarming,signifying potential health risk. The proximity of the sampled communities to gas flaring sites was a critical factor in explaining these health disparities. Results also revealed that gas flaring had a negative impact on the socio-economic well-being of the residents. The statistical model developed provided a quantitative framework for understanding the complex relationship between air pollution, socio-economic factors and health outcomes.

Keywords: Air pollution, Gas flaring, Socio-economic well-being, public health and Statistical model.

NSBMB/UPH/EB/015

Determination of Polycyclic Aromatic Hydrocarbons and Heavy metal levels in Selected fruits sold at Nembe/Bonny Jetty, Port Harcourt, Rivers State, Nigeria.

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ABSTRACT

Environmental contamination is the introduction of harmful substances into the environment; this contamination takes place around industrial jetties. Polycyclic aromatic hydrocarbons (PAHs) and heavy metals are pollutants that can be found in variety of food. Cucumber and guava are two popular fruits that are consumed in many parts of Nigeria. The aim of this study is to determine the concentration of heavy metals (Cd, Pb, Ni and Zn) and polycyclic aromatic hydrocarbons in fruits (cucumber and guava) exposed to emissions from Nembe/Bonny jetty as well as fruits not exposed to industrial emissions. Heavy metals and PAHs analysis were

done using Atomic Absorption Spectrophotometer (AAS) and Gas Chromatography respectively. The results obtained for heavy metals analysis showed that Cd, Pb and Ni levels were below detectable limit of 0.001mg/kg in the exposed as well as unexposed cucumber and guava respectively while the level of Zn was 9.02±0.10mg/kg in control cucumber, 9.28±0.10mg/kg in exposed cucumber, 9.12±0.03mg/kg in control guava and 9.63±0.03mg/kg in exposed guava. The results obtained in this study were within WHO permissible limit of 99mg/kg for Zinc. The total PAHs level of control and exposed cucumber were 2.77±0.04mg/kg and 8.80±0.06mg/kg respectively and 5.19±0.02mg/kg and 9.98±0.05mg/kg in control and exposed guava respectively. The study therefore indicates that fruits sold at Nembe/Bonny Jetty showed the presence of an essential trace metal and exposure to these industrial activities significantly increases the level of PAHs in the fruit samples which can be harmful for human consumption.

KEYWORDS: Polycyclic Aromatic Hydrocarbons, Heavy metals, Cucumber, Guava, Jetty.

NSBMB/UPH/EB/016

Health Risk of Heavy Metal and Genotoxicity of Polycyclic Aromatic Hydrocarbons (PAHs) in Extra-Virgin Olive Oils (EVOO) Available in Port Harcourt metropolis, Nigeria

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ABSTRACT

This research aims at determining the loading of contamination of some popular brands of extra-virgin olive oil (EVOO) in Port Harcourt, Nigeria, with genotoxic PAHs and Heavy Metals to ascertain its safety for consumption. The health risk associated with these heavy metals will be calculated and assessed. Extra virgin olive oil has experienced a surge in its consumption all around the world owing to its high nutritional content. Contamination with genotoxic PAHs and Heavy Metals can cause severe health defects if consumed regularly. PAHs and heavy metals are two distinct groups of ubiquitous contaminants with grave health consequences such as Tumorigenesis, carcinogenesis, organ failures etc. Samples of EVOO were analysed with Gas Chromatography/Mass Spectrophotometer and Flame Atomic Absorption Spectrophotometer (FAAS) for PAHs and heavy metals respectively. After extraction with Dichloromethane and digestion with aqua regia (HCl/HNO_3; 3:1) respectively, the results showed the presence of few genotoxic PAHs such as benzo[a]pyrene, PAH4 and PAH8 with concentrations above regulatory limits of 0.002µg/g, 0.01µg/g and 0.01µg/g respectively. Among the heavy metals, Pb and Cd showed the most alarming levels of contamination above regulatory limits of 0.1µg/g and 0.05µg/g, however, analysis of Health Risk Index of consumption showed all samples were safe for consumption.

Keywords: Health Risk Index, Heavy metal, PAHs, PAH4, PAH8

NSBMB/UPH/EB/017

Bacterial Contamination Assessment of Frequently Touch Surfaces: A Case Study of Bauchi State University, Gadau, Nigeria

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ABSTRACT

Bacterial contamination are ubiquitous in our environment and could be either pathogenic or non-pathogenic. This study aimed to identify and quantify bacteria around frequently touched surfaces at Bauchi State University, Gadau, Nigeria. The selected frequently touched surface areas included male, and female hostel door handles, upper staircase, desk and water taps of offices, computer keyboards and photocopier machines in selected computer business centers. A total of two hundred and sixty questionnaires (260) were administered while two hundred and twenty-five (225) were evaluated. The selected surfaces were swabbed and cultured to isolate germs and identify the bacteria. Following cultivation on MacConkey and Nutrient agar, the isolates were transferred to new Nutrient agar for accurate identification. The percentage age distribution of the respondents was 0.44% (<15 years), 50.22% (15 – 25 years), 32.44% (26 – 30 years), 10.67% (31 – 40 years), and 6.22% (>40 years) respectively. 57.33% were male while 42.67% were female. Of the respondents, 77.33% were students and 8.89% were academic staff. Respondents (26.67%) believed the selected surfaces are not adequately or regularly cleaned, 72.89% agreed that they can be contaminated from touching surfaces, 10.67% believed the contaminates are not dangerous microorganisms, and 88.44% believed that the contamination can be avoided by simple hygiene. The identified organisms included *Escherichia coli* (30.12%), *Proteus mirabilis* (18.07%), *Staphylococcus epidermidis* (13.25%) while the least identified was *Pseudomonas spp* (4.82%). Resistance was recorded in treatments with septrin, ciprofloxacin, amoxicillin, nitrofurantoinz, slightly with ofloxacin, augmentin, and cotrimoxazole while gentamycin and erythromycin were sensitive with all isolates. A channel for regular cleaning, sanitation and routine disinfectant should be encouraged.

Keywords: Bacteria contaminations; frequently touched surface; Sensitivity; Resistance; Isolate germs; Antimicrobials

NSBMB/UPH/EB/018

An Evaluation of the Concentrations of Cd, Ni, Cr and As from the Onitsha Segment of the River Niger

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The threat of heavy metals contamination in the aquatic environment is more serious than those of other pollutants due to their non-bio-degradable nature and accumulative properties. This study investigated the concentrations of Cd, Ni,Cr and As in water, sediments and fish obtained from the Onitsha segment of River Niger. Water, sediment and fish samples were collected from three different locations (Atani, Bridgehead and Otuocha) and the heavy metal concentration in the samples were determined using Atomic Absorption Spectrophotometer. Results show that in the fish samples, the concentrations of Cd (0.019 ± 0.012-0.027 ± 0.018 $mgkg^{-1}$) from the three locations were less than the WHO recommended level of 0.05 $mgkg^{-1}$, Ni concentrations (1.016 ± 0.201-1.807 ± 0.359 $mgkg^{-1}$) were less than the WHO recommended level of 3.7 $mgkg^{-1}$ while the Cr concentrations were less than the WHO recommended level of 2.0 $mgkg^{-1}$. In the water samples the concentrations of Cd from the three locations (0.011 ± 0.002- 0.018 ± 0.003 mgL^{-1})were greater than the WHO recommended level of 0.003 mgL^{-1}, Ni concentrations (0.015 ± 0.036-0.146 ± 0.057 mgL^{-1})were less than the WHO recommended level of 0.07 mgL^{-1} in two of the locations, Cr concentrations in all the locations were less than the WHO limit of 0.05 mgL^{-1}, while As concentrations (3.785 ± 0.788-5.478 ± 0.409 mgL^{-1}) in the three location were greater than WHO limit of 0.05 mgL^{-1}. The results obtained from this indicate the pollution of the river by the heavy metals, there is the need to control the source of pollution of these heavy metals as some of these heavy metals have been shown to be toxic.

Keywords: Heavy metals, physicochemical, concentrations, water, sediment, fish, Atomic Absorption Spectrophotometer

NSBMB/UPH/EB/019

Proximate, Vitamin and Anti-nutritional Content of Fresh and Roasted *Tympanotonus Fuscatus* Harvested From Bundu Creek, Rivers State

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ABSTRACT

T. fuscatus (periwinkle) is an invertebrate of the gastropoda class, dominantly found in brackish waters of tropical and subtropical regions. This study compared the nutritional and anti-nutritional content of *T. fuscatus* from Bundu Creek, and the impact of processing on its nutritional and anti-nutritional parameters. Fresh and roasted *T.fuscatus* samples were purchased from fishermen at Bundu Creek Port-Harcourt, Rivers State. Fresh *T.fuscatus* were deshelled using a clean plier and fleshy portion was collected and washed with distilled water whereas, roasted samples were placed in an oven at 106°C for 2hours. Both samples were homogenized using a preheated mortar and pestle which further proceeded for analysis. Proximate composition, anti-nutrients, minerals and vitamin contents were determined using standard analytical procedures. The percentage proximate composition showed that roasted periwinkles were significantly ($p<0.05$) higher in protein (58.57±0.29% -13.90±0.03%), lipid (5.50±0.00%- 2.26±0.03%),carbohydrates (11.64±0.09%-5.10±0.03%), ash (10.80±0.06%-

5.73±0.03%) and crude fibre content (5.54±0.16%-2.84±0.08%) when compared with fresh samples which had an increased moisture content (7.94±0.04%-70.19±0.05%). The anti-nutritional component saponins was significantly ($p<0.05$) increased in roasted samples (15.28±0.01%-3.80±0.00%) when compared with fresh samples. There was no measurable trace of Cyanogenic glycosides in both states. The roasting process significantly ($p<0.05$) reduced the presence of oxalate, phytate and flavonoids. For mineral content, Zinc, Iron, Magnesium and phosphorus were significantly ($p<0.05$) higher in roasted samples compared to Calcium. No significant difference was observed in vitamin content for the fresh and roasted samples. This research has shown that processing generally, helped to amplify the nutritional properties of *T. fuscatus.*

Key words: *T. fuscatus*; Bundu creek; Proximate composition; Vitamins; Antinutrients.

NSBMB/UPH/EB/020

Effect of Butachlor® on Biochemical and Haematological Parameters of *Clarias gariepinus* Fingerlings

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ABSTRACT

The aim of this study was to determine the effect of butachlor on biochemical and haematological parameters in Clarias gariepinus. Three hundred (300) fish of mean weight 23±1 g and mean length 7±2 cm was used for five treatments with three replicates for both treatments and control. Fish were subjected to butachlor at various concentrations of 0.01, 0.02, 0.03 0.04 and 0.05µm/l. The percentage mortality rate of the fish subjected to different concentrations of butachlor showed that the higher the concentration, the higher the percentage mortality recorded. Packed cell volume (PCV) lowest value is 14.00±0.00 at 0.5 µml and the highest value of 20.00 ± 0.00 at 0.2 µml while lowest value for Hemoglobin (Hb) is 66.6±0.00 at 0.5µml and the highest value is 100.00±0.00 at 0.2 µml. Alanine aminotransferase (AST), total protein (TP), creatinine, urea, K^+, Cl^- significantly increased when compared with the control. Results from this study shows that increasing concentration of butachlor present in the water body leads to abnormal behavioral responses, biochemical and haematological dysfunction in fish health.

Keywords: Pesticides, *Clarias gariepinus*, Fingerlings, Aquatic, Biochemical analysis.

NSBMB/UPH/EB/021

Health Risk of Heavy Metal and Genotoxicity of Polycyclic Aromatic Hydrocarbons (PAHs) in Extra-Virgin Olive Oils (EVOO) Available in PortHarcourt metropolis, Nigeria

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ABSTRACT

This research aims at determining the loading of contamination of some popular brands of extra-virgin olive oil (EVOO) in Port Harcourt, Nigeria, with genotoxic PAHs and Heavy Metals to ascertain its safety for consumption. The health risk associated with these heavy metals will be calculated and assessed. Extra virgin olive oil has experienced a surge in its consumption all around the world owing to its high nutritional content. Contamination with genotoxic PAHs and Heavy Metals can cause severe health defects if consumed regularly. PAHs and heavy metals are two distinct groups of ubiquitous contaminants with grave health consequences such as Tumorigenesis, carcinogenesis, organ failures etc. Samples of EVOO were analysed with Gas Chromatography/Mass Spectrophotometer and Flame Atomic Absorption Spectrophotometer (FAAS) for PAHs and heavy metals respectively. After extraction with Dichloromethane and digestion with aqua regia (HCl/HNO_3; 3:1) respectively, the results showed the presence of few genotoxic PAHs such as benzo[a]pyrene, PAH4 and PAH8 with concentrations above regulatory limits of 0.002µg/g, 0.01µg/g and 0.01µg/g respectively. Among the heavy metals, Pb and Cd showed the most alarming levels of contamination of the heavy metals above regulatory limits of 0.1µg/g and 0.05µg/g, however, analysis with Health Risk Index of consumption showed all samples were safe for consumption.

Keywords; Health Risk Index, Heavy metal, PAHs, PAH4, PAH8

NSBMB/UPH/EB/022

Effect of kaempferol on haematological indices and blood reduced glutathione of rats fed garri diet containing vacuum gas oil

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ABSTRACT

The aim of the study was to evaluate the changes in haematological indices and blood reduced glutathione (GSH) level in rat fed fried garri polluted with VGO treated with kaempferol. Thirty male Wistar rats were separated into six groups with five in each group and were treated for 28 days as follows: Group 1: Control: Fried garri normal diet (FGND). Group 2: FGND + 50 mg/kg b. wt of kaempferol. Group 3: FGND + 100 mg/kg b. wt. of kaempferol. Group 4: Fried garri diet containing VGO (FGD-VGO) only. Group 5 and 6 were given FGD-VGO and then treated with 50 and 100 mg/kg b. wt. of kaempferol. The rats were euthanized using CO_2 after experimental period of 28 days. Results obtained showed significant ($p<0.05$) decreased values of red blood cell count (RBC), packed cell volume (PCV), haemoglobin (Hb), mean cell haemoglobin (MCH), mean cell haemoglobin concentration (MCHC) and blood GSH with increased white blood cell count (WBC) and platelet counts in group 4 when compared with other groups. However, treatment of rats fed FGD-VGO with 50 and 100 mg/kg b.wt kaempferol showed significantly higher RBC, PCV, Hb, MCH, MCHC and blood GSH level and lower WBC and platelet counts when compared with rats given FGD-VGO only. In conclusion, intake of FGD-VGO may be toxic to the blood. However, treatment with different concentrations of kaempferol may reverse altered haematological parameters and blood GSH level to normal in a dose dependent manner.

Keywords: Blood GSH, garri diet, haemoglobin, kaempferol, vacuum gas oil

NSBMB/UPH/EB/023

Effects of crude oil and cadmium contaminated soil on the growth and development of maize plant (*Zea mays*)

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ABSTRACT

Crude oil and cadmium exposure to soil are not only hazardous to the soil structure but also to plants grown on it as well as animals that feed on such plants. However, these effects vary with plants, location and nature of soil. This study therefore investigated the effects of crude oil and cadmium contaminated soil on the growth and development of maize. The soil samples were partitioned into four (4) groups of 15 planting pots each; control, soil contaminated with cadmium only, soil contaminated with crude oil and cadmium, and soil contaminated with crude oil only. Crude oil and cadmium contamination were in the ratio of 80 ml: 0.4 g per soil sample (weighing 8 kg). Maize seeds were planted 7days post crude oil and cadmium contamination. Plant growth and development parameters were monitored weekly for a period of 12 weeks while the nutritional contents of the maize plant were evaluated after 12 weeks. The germination rate was significantly ($P<0.05$) reduced in the contaminated groups when compared to the control. Other indices: plant height, plant girth, leaf area and stem diameter were significantly reduced in the contaminated groups in relation to the control. The reduction was however not consistent in some of the parameters across the weeks. The proximate composition was also affected by the contaminants. These findings revealed that maize plant grown on crude oil and cadmium contaminated soil showed reduction in growth, development and key nutritional contents. These could have negative impact on global health and food security.

Keywords: Cadmium, crude oil, hydrocarbons, growth, *Zea mays*

NSBMB/UPH/EB/024

Effect Of Diesel Pollution on Proximate and Mineral Composition of *Spinacia Oleracea* Leaves.

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ABSTRACT

Soil polluted with diesel fuel can affects plant nutrients. This study was designed to evaluate the hydrocarbon content of diesel polluted soil and its effect on the proximate and mineral composition of *Spinacia oleracea.* Bags labeled group A, B, C, and D filled with 20 kg of loamy soil each were used for growing *S. oleracea*. Bags in groups B, C and D were polluted with 750 ml, 1500 ml, and 3000 ml of diesel respectively, while A was not polluted. *Sp*inacia *oleracea* was then planted on the soil, and allowed to grow for 12 weeks before harvesting for analyses. Proximate analysis and mineral composition were determined using the AOAC and APHA methods, while total hydrocarbon content (mg/kg) was analyzed with GC-FID. The result of proximate compositions showed that moisture (43.56 ± 1.88 - 58. 83 ± 1.10 %), ash (3.02 ± 0.24 - 5.77 ± 0.17 %), and fibre contents (0.76 ± 0.08 – 4. 81 ± 0.45 %) were significantly higher ($P < 0.05$) in the polluted samples when compared to that of the unpolluted sample. Significant decreased in the compositions of carbohydrate (32.67 ± 0.49 – 18.07 ± 0.11 %), protein (9.61 ± 0.73 – 6. 54 ± 0. 33 %), and fat (12. 96 ± 0.3 - 6.29± 0.72 %) were recorded in the polluted samples when compared to that of the unpolluted sample. Significant decreased in energy content (A = 285.76, B = 162.61, C = 173.16, and D = 209.16 Kcal/100 g) and slight decreased in total protein (A = 1.54, B = 1.22, C = 1.20, and D = 1.05 %) were recorded across the groups. The result of the mineral composition showed a decrease in manganese, while copper and zinc were significantly high in the polluted soil samples when compared to the unpolluted sample. This results obtained showed that diesel polluted soil could reduce the nutrient compositions and increase the levels of zinc and copper in plants.

Key words: Diesel, hydrocarbons, proximate composition, minerals, Pollution, *Spinacia oleracea*.

NSBMB/UPH/EB/025

The Impact of Cow Dung Augmentation for Remediation of Crude Oil Polluted Soil by *Eleusine indica*

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ABSTRACT

The enhanced remediation by *Eleusine indica* through augmentation of the soil with cow dung was carried out in this study. The study was conducted to investigate the influence of augmenting soils with cowdung on the potentials of *Eleusine indica* to clean up crude oil polluted soil. The soil was contaminated artificially with 50kg, 70kg and 100kg crude oil obtained from Nigerian Agip Oil Company, Omoku, Rivers State, over 8-weeks period. The study included an assessment of the remediation by *Eleusine indica* on the contaminated soil containing polycyclic aromatic hydrocarbons (PAHs) and later augmented with cowdung. The result revealed that, for 50kg, 70kg and 100kg of crude oil contamination, the percentage loss of PAHs in the soil augmented with cowdung after the remediation were 10%, 4% and 22% respectively, compared to the loss observed in the soil without augmentation. Significant differences were noticed between the augmented soils and the non-augmented soil ($p<0.05$). The results obtained in this study show that augmenting crude oil polluted soils with cow dung will enhance remediation and restoration of crude oil polluted soil.

NSBMB/UPH/EB/026

EVALUATION OF ANTIOXIDANT POTENTIALS OF AQUEOUS EXTRACT OF *Lasianthera africana* LEAF ON MALE WISTAR RATS INDUCED WITH BENIGN PROSTATIC HYPERPLASIA

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ABSTRACT

This study evaluated the antioxidant potentials of aqueous extract of *Lasianthera africana* leaf on male wistar rats induced with Benign Prostatic Hyperplasia (BPH). Thirty (30) male wistar rats were randomly into six groups of 1-6 with five rats each. Group 1 were fed *ad libitum* with normal water and rat pelletized feed and served as the negative control. Group 2 were induced but received no treatment. Benign Prostatic Hyperplasia was induced to the rats in groups 3-6 four days and thereafter treatment commenced and lasted for 28 days. The reference drug (Contiflo-XL 400µg) was administered to group 3. The rats in groups 4 and 5 received 100mg and 200mg of the plant aqueous extracts respectively while group 6 were administered a combined dose of 100mg of plant extract and contiflo-XL. Qualitative phytochemical screening of the plant extract revealed the presence of polyphenols (+++), alkaloids (+++), saponins (++), tannins (++) and flavonoids (+). The PSA level was significantly induced after

the induction of Benign Prostatic Hyperplasia. However, in group 6 when treated with a combined dose of 100mg of plant extract + contiflo-XL 400µg, there was a significant decrease in the PSA level. The other groups, 3-5, were also increased when compared to the control group. For all the antioxidant biomarkers analyzed, a significant increase was observed in group 2 when compared to group 1. After the treatment period, Malondialdehyde and catalase significantly increased while glutathione and superoxide dismutase did not show any significant increase when compared to group 1 except the group treated with 100mg of the plant extract. This study therefore revealed that the plant *Lasianthera africana* is suitable for the management of Benign Prostatic Hyperplasia and has the potential to ameliorate the induced oxidative stress.

Keywords: *Lasianthera africana,* Benign Prostatic Hyperplasia, Antioxidants

NSBMB/UPH/EB/027

Polycyclic aromatic hydrocarbons profiling in Selected Seafoods and Water from Ogugu River, Rivers State

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ABSTRACT

This study evaluated the polycyclic aromatic hydrocarbons profile in selected seafoods and water from Akpajo, Eleme Local Government Area of Rivers State. Seafoods; (*Tilapia guineensis (Tilapia Fish), Callinectes sapidus* (Blue crab) and *Matacostraca decapoda* (cray fish), designated as P1, P2 and P3 respectively) and water sample from Ogugu River and its surrounding farm were collected and were analyzed for the PAHs 16 content using Gas Chromatography Flame Ionization Detector (GC-FID). The analysis revealed maximum mean value in *Tilapia guineensis (*P1) sample (0.025 mg/kg) with minimum mean value (0.0116 mg/kg) obtained in *Callinectes sapidus* (Blue crab). *Tilapia guineensis* (P1) sample also has maximum total Carcinogenic PAHs (0.0164 mg/kg) which constitutes about 65.82% of total PAHs in *Tilapia guineensis (*P1) sample, While *Callinectes sapidus* (Blue crab) P2 has minimum total carcinogenic PAHs (0.008mg/kg), however sampled water gave least percentage carcinogenic PAHs (47.84%). Health risk assessment (HRA) of these PAHs was done to investigate potential carcinogenic and non-carcinogenic risks adults and children's populations are exposed to using Life lung cancer risk, Incremental Life cancer risks, Excess cancer risks, CDI, Dietary Daily Intake and PAH4 Index. These indices shows that adult and children population exposed to these samples could be highly at risk as evidenced in the obtained values which where higher than probable risk-free limits of 10^{-6} to 10^{-4} as stated by USEPA. The PAH diagnostic ratio revealed source of PAHs as pyrogenic. It is however recommended that strict measures be developed and adopted to restrict further pollution of Ogugu river and its surrounding niche.

NSBMB/UPH/EB/028

Seasonal Assessment of Pollution Status, Bioaccumulation, and Potential Human Health Risk of Heavy Metals in Shrimps (*Penaeus Monodon)* And Water From the Great Kwa River in Calabar, Nigeria

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ABSTRACT

The deterioration of water quality in rivers is caused by various factors, with heavy metals contamination being a significant contributor. This research evaluated the pollution levels, bioaccumulation, and potential health risks associated with heavy metals in shrimp (*Penaeus Monodon*), and water from the Great-Kwa River in Calabar, Nigeria. Samples were collected for wet and dry seasons. The physical characteristics of the water were assessed *in situ*. The concentrations of heavy metals were determined through wet digestion and analyzed using an Atomic Absorption Spectrophotometer. In shrimp, the iron and lead were significantly higher ($p < 0.05$) in the wet season compared to the dry season, and iron, chromium, and lead in water. The Estimated Daily Intake of the metals in both seasons was within the recommended upper tolerable limits for heavy metals in seafood. The Target Hazard Quotients were also within safe limits. The Hazard Indices were less than one, indicating minimal or no significant health risks. The individual Incremental Lifetime Cancer Risks for Chromium, Cadmium, and Lead ranged from 10^{-7} to 10^{-4}, considered acceptable. Therefore, shrimp consumption from the Great-Kwa River is unlikely to pose significant carcinogenic risks associated with the examined metals.

Keywords: Biomonitoring, Heavy Metals Toxicity, Great Kwa River, Seasonal Variation, Health Implications, Environmental Pollution

NSBMB/UPH/EB/029

Heavy Metal and Minerals Profile of Earthworms From Polluted and Non-Polluted Environment in Rivers State

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ABSTRACT

The study investigated the level of heavy metals in earthworms isolated from a half decade drilling sites located in Rivers state surrounding soil. Contaminated soils were gotten from Atali and Agbada while the control experiments were sited at Rumukrushi. Heavy metals of Hg, As and Cd were found at below detectable limit range (BDL) in both the contaminated and non-contaminated soil. Earth worm samples isolated from the respective soils and the non-polluted soil showed bioaccumulation level of the minerals in the following order: SO4>NO3>P>N. Earthworms from the polluted soil showed higher concentration of Nitrogen and phosphorus when compared to the control experiment than sulphate and nitrate

respectively. Heavy metals and minerals have deleterious impact on earthworms at all levels of organization. These effects on earthworms may have disproportionate adverse consequences for community stability as well as serious ecological consequences for the entire terrestrial ecosystem. So, heavy metal pollution of soil poses a serious threat to earthworms, which may reduce their activity and posing a risk to the environment and human health.

Keywords: Earthworms, Environment, Heavy Metal, Minerals Profile

NSBMB/UPH/EB/030

Acute One-Hour inhalation toxicological study of Cashew (*Anacardium occidentale* L.) nut shell fumes on Wistar Rats and Cockerel Chickens

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ABSTRACT
Roasting of cashew nuts has been reported by local folks to have fatal effects on domestic animals especially birds. This study compared the toxicological effect of acute (one-hour) inhalation of cashew nut fumes (CNSF) on Chickens and Rats. Twenty-four mixed sex wistar rats were divided into four groups as; control, rats exposed to 500ppm/hr., 1250ppm/hr. and 2500ppm/hr. of CNSF for one (1) hour. Eighteen Cockerel chickens were also divided into three groups as; control (unexposed chickens), chickens exposed to 500ppm/hr. and 1000ppm/hr. of CNSF for one (1) hour. The toxicological effect of the exposure were measured on hematological parameters in Chickens and Wistar, the histological examinations of the liver and hearts were also carried out. After one-hour exposure, the toxicity signs noted include; scratching, twitching, irregular breathing, tremors. All rats exposed to 2500ppm/hr. of CNSF died with moderate pulmonary congestion within one hour of exposure. Analysis of the Hematological parameters in the surviving animals showed a significant ($p<0.05$) increase in hemoglobin (Hb%), packed cell volume (PCV%) and white blood cells (WBCx109L) counts in both chickens and wistar rats exposed to CNSF compared with the unexposed groups. No significant ($p>0.05$) differences were found between male and female rats for all the hematological parameters measured. The histopathological evaluation showed a mononuclear inflammatory infiltration of the striated heart muscles (moderate myocarditis) and of the septa of alveoli (moderate pneumonitis) in the lungs. These results further highlight the adverse health effects of exposure to cashew nut fumes both in animals and in humans.

Keywords: Cashew nuts Fume, inhalation toxicology, hematology, histological, Chickens, Wistar Rats

NSBMB/UPH/EB/031

Impact of Quarry Dust on Haematological And Hepatic Parameters of Guinea Pigs Exposed to Quarry Dust at Umuoghara And Amoffia Ngbo Quarry Sites of Ebonyi State

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ABSTRACT

In recent years, Ebonyi state has experienced a rapid increase in proliferation of quarry industries due to high demand of stone for construction in the fast developing state and its neighbors. This has contributed enormously to dust pollution within the vicinity of these quarry sites. We investigated the effect of quarry dust on some hematological and hepatic parameters of guinea pigs exposed to quarry dust at Umuoghara (umr) and Amoffia Ngbo (amn) quarry sites in Ebonyi State. The control (ctr) site was college of agricultural science (CAS) Campus of Ebonyi state University. A total of 288 adult male guinea pigs which weighed between 500g to 800g were used for the study. They were divided into 3 groups of ninety six (96) guinea pigs each and labeled umr, amn, and ctr respectively. Each group was further subdivided into 4 subgroups of 24 guinea pigs each. Groups 'umr' and 'amn' were exposed to the respective quarry sites, while group 'ctr' was kept at control site and analysis carried out in three-month intervals. Haemoglobin concentration (Hb), red blood cell count (RBC), pack cell volume (PCV), white blood cell count (WBC), platelet, activities of aspartate aminotransferase (AST), alanine aminotransferase (ALT), gammaglutamyltransferase (GGT) and alkaline phosphatase (ALP), total protein, albumin, and globulin of exposed guinea pigs were measured with duration of exposure. The Hb, RBC, and PCV were significantly ($P<0.05$) lower in the exposed guinea pigs than the control and decreased significantly ($p<0.05$) with length of exposure, while WBC and platelet were significantly ($P<0.05$) higher in the exposed group. The activities of the serum AST, ALT, GGT and ALP were significantly ($P<0.05$) higher in the exposed groups than the controls and increased significantly ($P<0.05$) with length of exposure while the total protein, albumin and globulin concentrations were significantly ($P<0.05$) lower in the exposed than the control. It was observed that the effects of exposure to dust on the guinea pigs were higher in site amn than umr. The findings suggest that the adverse effect of exposure to quarry dust depends on the quantity of dust and duration of exposure.

NSBMB/UPH/EB/032

Impact of Coal Waste Contamination on Essential Trace Elements: Exploring Diversity, Plant Growth Implications, and Food Sustainability

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ABSTRACT

Coal, a major energy source, is widely used in various countries for electricity generation. However, coal mining and usage have raised concerns about environmental and public health risks, including greenhouse gas emissions, biodiversity loss, degraded soils and ecosystems, water resources, and air quality. This study examined the effects of coal waste contamination on physicochemical properties, essential trace elements, and nutrients, as well as the biochemical and morphological identification of bacteria in contaminated and control samples. These factors are crucial for plant growth and food sustainability in soils affected by coal waste from an industry located in Ninth Mile, Enugu State. The parameters assessed included sand, silt, clay, textural glass, pH (H_2O), phosphorus (P), nitrogen (N), organic carbon (OC), organic matter (OM), calcium (Ca), magnesium (Mg), potassium (K), sodium (Na), exchangeable acidity (EA), effective cation exchange capacity (ECEC), base saturation (BS), and trace essential elements (Mo, Cu, Fe, B, Zn, and N). The results showed that the percentage results for sand, clay, PH (H_2O), organic carbon (OC), organic matter (OM), exchangeable acidity, effective cation exchange capacity (ECEC), base saturation (BS), calcium, magnesium, phosphorus (P), and nitrogen (N) were greater in control soil samples but had a lesser silt composition, sodium (Na), and potassium (K) in c/mol/kg and mg/kg, respectively. The results for essential trace elements in plants were as follows; Molybdenum (Mo): Control: 1.77 ± 0.09^{a}, Contaminated: 1.61 ± 0.13 , Copper (Cu): Control: 0.10 ± 0.00 , Contaminated: 0.14 ± 0.00 ; Iron (Fe): Control: 0.25 ± 0.01 , Contaminated: 0.02 ± 0.00 ; Boron (B): Control: 0.12 ± 0.01, Contaminated: 0.12 ± 0.00^{b}; Zinc (Zn): Control: 0.05 ± 0.01 , Contaminated: 0.02 ± 0.00 Nitrogen (N): Control: 0.11 ± 0.00^{a}, Contaminated: 0.06 ± 0.00^{b}.The biochemical and morphological characterization of bacteria using metabolic and enzymatic activities, along with Gram's staining technique, indicated variations in the activities of enzymes ornithine decarboxylase, catalase, citrate, urease, coagulase and the cytochrome c oxidase enzyme. The findings suggest the need for effective soil management and remediation strategies to restore and maintain soil quality in soil especially in contaminated areas to boost agricultural productivity and ecosystem sustainability which are linked to sustainable Development goals 2, 3 11, 13 and 15. Metagenomics of the rhizospheric microenvironment is necessary for understanding the roles and interaction of microbial communities in the environment.

Keywords: Coal waste contamination; Physico- Biochemical characterisation; Essential trace elements; Soil quality; Microbial biodiversity; Ecosystem sustainability

NSBMB/UPH/EB/033

Palm Oil Mill Effluent: A Possible Panacea For Improved Soil Fertility.

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ABSTRACT

Palm oil industries have been of great agro-economic importance in Rivers State, Nigeria, and the world at large. The effluents produced from the palm oil mills have posed great concerns due to the indiscriminate disposal of the effluents, however, it could also be of benefit to the integrity of the soil if properly handled. This study assessed the impact of palm oil mill effluent (POME) on the integrity of soil in Omerelu, Rivers State, Nigeria. Topsoil samples were collected from the study site (POME polluted) at a distance of 10 meters and 30 meters in triplicates each and the control samples (non-polluted site) of 100 meters away from the study site. A total of 9 samples were collected and taken to the laboratory for analysis of Organic Carbon, Total Nitrogen, available Phosphorus, and pH. All analyses were carried out using Standard Laboratory Procedures. The results obtained revealed that major soil nutrients, notably organic carbon, total nitrogen, available phosphorus and soil pH, were found to be higher in POME soil than non- POME Soil. This study opines that due to the non-toxic and non-destructive effect on soil when applied in controlled concentration, palm oil mill effluent can be used as supplements (organic manure) to improve soil fertility. As such, when properly treated and packaged, it can be used by farmers both in the rural and urban areas to improve soil fertility, thereby enhancing agricultural productivity for global, national, and regional food demands.

Keywords: Palm oil mill effluent, Organic carbon, Soil, Available phosphorus, Total Nitrogen, pH, Soil fertility

NSBMB/UPH/EB/034

Assessment of Bioaccumulation of Heavy Metals in Selected Vegetables Grown in Some Irrigation Sites in Katsina State

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Vegetables are crucial components of a healthy diet, providing essential nutrients such as vitamins, minerals, and fibre. However, contamination with heavy metals poses significant

health risks to consumers. Prolonged consumption of contaminated vegetables can result in the accumulation of metals in organs, leading to various diseases. This study investigated the levels of mercury (Hg), cadmium (Cd), chromium (Cr), iron (Fe) and lead (Pb) in selected vegetables including spinach, cabbage and lettuce grown in some irrigation sites in Katsina State, using Atomic Absorption Spectrometry. The findings revealed that Hg was undetected in most samples, while the remaining metals were detected at varying levels. Notably, Pb (0.98±0.00 mg/kg to 4.01±0.80 mg/kg) and Cd (0.001±0.00 mg/kg to 0.022±0.00 mg/kg) were present in all samples at levels exceeding those recommended by the Food and Agriculture Organization (FAO). The highest concentrations of Pb (1.81±0.03 mg/kg to 4.01±0.80 mg/kg) and Fe (8.01±1.24 mg/kg to 12.61±2.06 mg/kg) were observed in vegetables grown in 'Kofar Sauri' irrigation site, while the lowest levels of Hg (0.001±0.0 mg/kg to 0.002±0.0 mg/kg) and Cd (0.004±0.00 mg/kg to 0.021±0.00 mg/kg) were found in those grown in 'Ajiwa Dam' irrigation site. Chronic consumption of heavy metal-contaminated vegetables can lead to severe health complications. Therefore, the government must prioritize comprehensive sampling, periodic monitoring, and identification of contamination sources in the irrigation sites of Katsina and its environs. Implementing stringent regulatory and control measures while promoting sustainable agricultural best practices are essential steps to mitigate the risks associated with heavy metal contamination to ensure food safety for the population.

NSBMB/UPH/EB/035

Insecticidal Effect of Cloves, Neem-seed, and Orange peels Oils and aqueous Garlic Extract on Termite, Mosquitoes and German Cockroaches

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ABSTRACT

The pervasive use of synthetic insecticides is becoming worrisome especially in developing countries. These chemicals have been implicated to induce numerous undesirable health consequences to human and environment. Therefore, the search for plant based insecticides with less harmful effects is highly important. The study therefore, evaluate the insecticidal potentials of clove buds, neem seeds, orange peels and aqueous garlic extract on termites, German cockroaches and mosquitoes. The oil was extracted from the fined ground samples using 85% N-hexane while garlic extract was prepared using distilled water. Insecticidal test was conducted on termites, german cockroaches and mosquitoes using an aliquot of individual extracted oil and aqueous garlic extract at varying concentration of 100 to 400 mg/L. The synergistic effect of the combined aliquot of different oils was also evaluated. Mortality was evaluated at every 30 minutes of exposure. The study observed significant insecticidal effects of different concentration of extracted oils from 60-100% compared to control. A 80% and 100% mortality was documented in termites and german cockroaches treated with clove buds oil extract respectively, 80% and 90% mortality was also observed in termites and mosquitoes

treated with neem seeds oil extract. 90% insecticidal effect was recorded in both termites and mosquitoes treated with orange peels oil extract respectively. Aqueous garlic extract was only effective in termites and mosquitoes (70%and 80% respectively). The significant synergistic effect of the combined oils shows 100% mortality in termites and mosquitoes. However, aqueous garlic extract shows non-significant effect on german cockroaches compared to control. Therefore the study suggest the possibility of using oils extract of the samples as bio-insecticides against termites, german cockroaches and mosquitoes in order to reduce menace of chemical insecticides.

Keywords: Insecticide, Cloves, Orange- peels, Health Consequences

NSBMB/UPH/EB/036

Health Risk Assessment of Heavy Metals and Polycyclic Aromatic Hydrocarbon Contamination in Water And Seafood from Bakana River in Kalabari, Rivers State

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ABSTRACT

This study evaluated human health risk of heavy metals (HMs) and polycyclic aromatic hydrocarbons (PAHs) associated with consumption of seafood from Bakana river in Kalabari, Rivers State, Nigeria. Triplicate samples of water and seafood (*Tympanotomus fuscatus*, *Crossostrea gasar*, *Macrobrachium rosenbergii, tilapia*) were collected from Bakana river, labelled and preserved. Physicochemical parameters were measured using standard laboratory procedures. HMs and PAH levels were determined using Atomic Absorption Spectrophotometer (AAS) and Gas Chromatograph - Flame Ionization Detector (GC-FID) respectively. Water quality assessment showed turbidity of 30.00 ± 0.63 NTU and BOD value of 8.06 ± 0.66 (mg/l), both above permissible limits. Proximate analysis showed that *Macrobrachium rosenbergii* has the highest percentage of crude protein (19.71%) and carbohydrate (8.38%) when compared with other seafood in this study. Seafood samples studied showed the presence of heavy metals namely Cr, Cd, Cu, Pb, Zn, Ni, but values were below WHO permissible limits. PAH compounds (Naphthalene, Acenaphthylene, Acenaphthene, phenanthrene, Fluoranthene, Pyrene, Chrysene) in water and seafood samples showed significant difference ($p \leq 0.05$) and where all above WHO permissible levels. Potential carcinogenic health risk was measured using indices such as Estimated Daily Intake (EDI), Target Hazard Quotients (THQ) and Carcinogenic Health Risk (CHR). This study revealed that heavy metals (Cd, Pb, Ni, Cr) and PAH levels in the seafood samples pose carcinogenic risk. Therefore, consumers of the studied seafood samples from Bakana river may be exposed to the risk of consuming toxic environmental pollutants.

Key words: Heavy metals, Polycyclic aromatic hydrocarbons, Seafood, Water, Risk assessment

NSBMB/UPH/EB/037

Carcinogenic and Non Carcinogenic Health Risk Assessment of Groundwater Wells in Gadau, Kubuwa and Walai Rural Communities in Bauchi State, Nigeria

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ABSTRACT

This study was aimed at assessing the probable health risk involved in the consumption and utilization of groundwater wells in Gadau, Kubuwa and Walai communities in Bauchi State Nigeria based on the evaluation of the physicochemical parameters and the heavy metals concentration through the ingestion and dermal routes. This study was conducted around Gadau, Kubuwa and Walai in Itas / Gadau local Government Area in Bauchi State, Nigeria. The samples were collected in a clean water sample bottles between March and September 2023. The physical and chemical parameters (TDS, TSS, Hardness , turbidity, EC, pH, alkalinity, SO42-, NO3, Cl-) were analyzed using standard methods and the concentration of the heavy metals (Co, Cu, Cd, Ni and Pb) were determined using the Atomic Absorption Spectrophotometer. Results obtained from the physicochemical and heavy metal analysis were compared with the world health organization (WHO) standard. None of the physicochemical parameters analyzed exceeded the permissible limit of the WHO. However, the concentration of the heavy metals exceeded the WHO permissible limit with values of toxic elements such as Pb reaching 241 µ g /L, 201 µ g /L and 265 µ g / L in Gadau, Kubuwa and Walai respectively. Microbial analysis revealed the presence of Staphylococcus aureus and E coli in all water samples from the three study locations. Human health risk assessment of the water samples showed a higher risk on children than adults through ingestion than through dermal routes and both carcinogenic (Co, Ni, Cd and Pb) and non-carcinogenic risks were evidential. Proper treatment and purification processes should be done by the appropriate authorities on all three water sources before usage.

Keywords: water, health risk assessment, heavy metals, physicochemical, carcinogenic, non carcinogenic

NSBMB/UPH/EB/038

Biophysicochemical Properties and In-Vitro Antioxidant Capacity of *Talinum Triangulare* Leaves Harvested at Choba, Rivers State, Nigeria

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ABSTRACT

Talinum triangulare commonly known as waterleaf is a popular vegetable used in Nigeria, but little is known about its regional variants. By carefully examining the biophysicochemical properties, and in-vitro antioxidant capacity of *T. triangulare* leaves harvested in Choba, Rivers State, Nigeria, this study explored the special qualities of this plant. Well-established methodologies were utilized to detect and quantify key bioactive compounds such as flavonoids, phenolics, and alkaloids. Standard antioxidant assay methods for peroxidase, superoxide dismutase (SOD) and DPPH (2,2-diphenyl-1-picryhydrazyl) were employed in evaluating the plant's capacity to scavenge free radicals. The result revealed high moisture content (91.93 ± 0.59 %), with low ash and crude fiber content at 7.51 ± 0.17 % and 8.02 ± 0.09 % respectively. The phytochemical analysis indicated the presence of flavonoids, alkaloids, and phenols at concentrations of 180.07 ± 21.18 mg/100g QE, 87.54 ± 2.19 mg/100g, and 219.52 ± 7.12 mg/100g respectively. The in-vitro antioxidant activity results revealed 0.099 ± 0.021 activity/min/unit/g for peroxidase, and 0.205 ± 0.008 Units/g fresh weight for SOD. Meanwhile, the 50 percent inhibitory concentration (IC50) value of the sample against DPPH activity was 19.29 as against 0.13 recorded by the standard (ascorbic acid). This study revealed that *T. triangulare* leaves is rich in moisture and key phytochemicals and, also possess significant antioxidant capacity. In conclusion, *T. triangulare* harvested from Choba locality can be adopted as a regimen for suppressing or neutralizing free radicals.

Keywords: Antioxidant activity, Bioactive compounds, Biophysicochemical properties, Free radicals, and Waterleaf.

NSBMB/UPH/EB/039

Relationship between Otoliths and Fish Length of Selected Catfish in Niger Delta, Nigeria

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ABSTRACT

Catfish are important fishery resources in the Niger Delta, therefore they require studies on its growth patterns and morphometrics. Otoliths, structures found in the inner ear cavity of teleost fishes, can be used to identify catfishes and estimate the age and size of the fishes. This study examined the relationship between the length and width of catfish otoliths and their fish length. A total of 80 individuals consisting of 6 species from 5 families (Ariidae, Claroteidae, Claridae, Schilbeidae and Mochokidae) were collected from New Calabar and Ase Rivers in Niger Delta. The fishes were identified, measured, otoliths removed and measured using standard methods. Otolith length (OL) and width (OW) were examined separately using imaging software. The relationship between otolith dimensions and fish length (FL) was expressed by a simple linear

regression using SPSS (Statistical Package for Social Sciences) software. The mean total length of the fish species are as follows: *Arius heudelotti* 32.38 ± 2.89 cm, *Chrysichthys furcatus* 14.26 ± 0.45. cm, *Clarias gariepinus* 36.51 ± 8.41 cm, *Clarias species A* 32.57 ± 6.46 cm, *Clarias species B* 19.22 ± 3.14 cm, *Schilbe uranoscopus* 21.61 ± 1.97 cm and *Synodontis membranaceus* 10.55 ± 0.72 cm. The correlation coefficient R^2 between the fish and OL ranged from 0.89 to 0.98. The correlation coefficients between the FL and the OW ranged from 0.86 to 0.99. This study has shown a strong relationship between the catfish length and otoliths dimensions, indicating that Otolith length and width could be used to determine fish length.

Key Words: Otolith; catfish; total length; new Calabar River; Ase River; Niger Delta

NSBMB/UPH/EB/040

Assessment of Maternal and Fetal Heavy Metal Burden and Its Impact on Fetal Outcomes: A Study in Enugu, Nigeria

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ABSTRACT

Human exposure to heavy metals has been linked to various health disorders, but its impact on fetal outcomes remains uncertain. This cross-sectional study, conducted at Balm of Gilead Hospital in Enugu State, Nigeria, aimed to evaluate the association between maternal and fetal heavy metal burdens and fetal outcomes. Following institutional ethical approval, 150 pregnant women in their third trimester, aged 18 to 47, participated voluntarily. Lead, cadmium, mercury, and arsenic concentrations were measured in maternal and cord blood samples using standard methods. Birth weight, femur length, head and abdominal circumference, and Apgar scores were determined. Statistical analysis was performed using SPSS version 27.0, with results presented as mean ± standard deviation. Means were compared using the Student's "T" test, correlations determined with Pearson's correlation and binomial logistic regression analysis. Significance was set at $p<0.05$. Maternal serum concentrations of As, Cd, Pb, and Hg were significantly higher ($p<0.0001$) than cord blood concentrations and exceeded WHO recommended levels. Significant correlations were found between cord and maternal concentrations for As, Cd, Pb, and Hg. Positive correlations were observed between maternal blood Pb and birth weight and Apgar score ($p<0.05$), while blood Hg correlated negatively with birth weight ($p<0.01$) and positively with abdominal circumference ($p<0.05$). Cord blood Pb positively correlated with birth weight ($p<0.05$), and Hg inversely correlated with Apgar score ($p<0.0001$). The study revealed significant maternal heavy metal toxicity, exceeding recommended limits, highlighting the need for monitoring and interventions to mitigate adverse maternal-fetal health effects in contaminated environments.

NSBMB/UPH/EB/041

Risk Assessment of Hydrocarbon Impacted Seafood Harvested from Aleto River In Eleme, Rivers State, Nigeria.

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ABSTRACT

This study assessed risk of hydrocarbon impacted seafood from Aleto River in Eleme, Rivers State. Heavy metal level was determined using atomic absorption spectroscopy (AAS), Polycyclic Aromatic Hydrocarbons and Volatile Organic Compounds (BTEX) in seafood samples were measured using Gas Chromatography-Mass Spectroscopy (GC-MS) instrument and the extent of Total Petroleum Hydrocarbon contamination in the study samples was ascertained using the Gas Chromatography–Flame Ionization Detector (GC-FID). Concentrations of PAHs and TPHs in seafood were significantly higher in *Cardisoma armatum* (68.48±0.09 mg/kg and 36.23±0.02 mg/kg respectively) when compared to *Uca tangeri* (53.83± 0.07 mg/kg and 32.35± 0.02 mg/kg respectively) and *Oreochromis noliticus* (28.21± 0.03 mg/kg and 14.48± 0.04 mg/kg respectively). *U. tangeri* had the highest concentration (39.43±0.05 ppm) of VOC's when compared to *C. armatum* (34.88± 0.03ppm) and *O. noliticus* (19.71± 0.03 ppm). Target hazard quotient (THQ), hazard index (HI) and average daily dose (ADD) values of *C. armatum* and *U. tangeri* were higher than the reference values. This study revealed significant presence of TPH and PAH contaminants in seafood from Aleto River and therefore, poses carcinogenic health risk to the populace.

Key words: Heavy metals, Total Petroleum Hydrocarbon, Polycyclic Aromatic Hydrocarbon, Seafood

NSBMB/UPH/EB/042

Antioxidant Activities of Hydrocarbon-Degrading Bacteria on Petroleum-Impacted Soils in B-Dere Gokana, Rivers State

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ABSTRACT

The effect of oil spillage from oil exploration activities in petroleum-producing areas is alarming. This study investigated the free radical-scavenging activities of some Hydrocarbon-degrading Bacteria (*Pseudomonas* sp., *Salmonella* sp., *Citrobacter* sp., *Bacillus megaterium*

and *Bacillus subtilis)* in oil-polluted soils in Baranyonwa-Dere (B-dere), Gokana Local Government Area of Rivers State, Nigeria. 2,2-Diphenyl-1- picrylhydrazyl (DPPH) assay was used to determine the free radical-scavenging activities of the Bacteria at different concentrations (20 µg/mL, 50 µg/mL and 100 µg/mL). Results obtained revealed that the hydrocarbon-degrading bacteria produced significantly ($p < 0.001$) higher inhibition of DPPH, in concentration-dependent manner, relative to ascorbic acid. It may be concluded that the four bacterial species used in this study possess potent antioxidant activities and could be explored in bioremediation of oil-polluted soils.

Keywords: Oil Spill, Contaminated soil, Hydrocarbon-degrading Bacteria, Antioxidant activity.

NSBMB/UPH/EB/043

Living in Gas Flare Host Communities; How do our Kidneys Respond?

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ABSTRACT

Investigation of the impact of exposure to gas flare on kidney function of women (pregnant and non-pregnant), living in two communities (Bonny and Omoku) in the Niger Delta Regions of Nigeria was conducted, with Kogi State as control. Blood samples were collected from volunteers. The plasma was extracted after centrifugation and analysed. Parameters tested were blood urea, creatinine, electrolytes and albumin. All analyses were done using standard analytical methods. Urea (mmol/L) results were within the reference range (RR) with values ranging from 4.08±0.11 to 5.29±1.21. The highest value was recorded for pregnant women (PW) from Omoko and the lowest for PW from Kogi. Creatinine (mmol/L) results were also within the RR, measuring between 69.44±1.90 to 84.11±1.95, the lowest measurement was recorded for PW from Kogi, and the highest for non-pregnant women (NPW) from Bonny. The results obtained from the electrolyte analyses for all study groups were within the RR, except potassium for NPW from Kogi which was above. The lowest potassium level was 3.93±0.07 for NPW of Omoku, and the highest was 5.15±1.18, for NPW from Kogi. The albumin level for all the test groups were within the RR, except that for PW from Bonny, 38.39±0.30, which was significantly lower ($p \leq 0.05$) than all the other test groups, and lower than the RR. Except for potassium level for NPW from Kogi, all the parameters tested, recorded lower values for the results from the control site when compared to the test sites. The study thus indicates that exposure to gas flare may have impacted on the kidney function of inhabitants of the gas flare host communities.

Keywords: Gas Flare, kidney function, plasma, pregnant, non-pregnant

NSBMB/UPH/EB/044

Analysis of Heavy Metals Concentrations In Selected Human Hair (Natural (Undyed), Dyed, and Grey Hair): The Potential Health Effects on Human

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ABSTRACT

Analysis of the human hair (Pb, Se, As, Zn, Cr, Fe) were carried out using Atomic Absorption Spectrophotometry. The results of the triplicate analysis of the mean concentration (mg/L) ± standard deviation shows significant variation ($P<0.05$). The result of the heavy metals in natural(undyed),dyed and grey hair mean concentrations of the selected heavy metals along with relevant standard deviation in Human Hair are shown in Table 1.0 and 2.0 respectively. In Table 1.0 Fe, shows no significant differences in the grey hair concentration of Iron,(0.04±0.01mg/L)with undyed hair,(0.06±0.02mg/L) which indicates that the hair type is not for iron accumulation ($P<0.05$).The mean concentration of Zn was significantly increased in undyed hair (0.23±0.01mg/L) 'dye hair(0.28±0.09mg/L) when compared when compared with the control (0.48±0.10 mg/L) $P<0.05$. Which shows use of hair dye products and age, exposure to habitual use of galvanised roofing, regular use of rain water from galvanised container, freshly form Zn vapour, Zn based anti-Dandruff shampoos can affect Zn concentration. In table 2.0 the mean concentration of Cd in dyed hair (0.07±0.01mg/L) was within the reference range(<0.1mg/L) and was above reference range in grey hair(0.24±0.20mg/L).From the literature review, Cd absorption is reduced by Zn, Ca and Se. Also cigarette smoking significantly in Cd intake. Elevated Cd concentration in hair could be caused by exogenous contamination which may come from permanent solutions, dyes, cares, bleach and some hair sprays.The mean concentration of Fe in dyed hair(0.04±0.01mg/L) and grey hair(0.02±0.01mg/kg) in table 2. 0 increased significantly withe mean concentration of the control group(0.36±0.11mg/L)$P>0.05$ but was below the reference range(0.6-1.5mg/L). Mean concentration of Pb in dyed hair and grey hair(0.03±0.02mg/L) was within the reference range(<0.6mg/L)

Keywords: Heavy metals, concentration, dye, Atomic absorption, spectrophotometer

NSBMB/UPH/EB/045

Assessment of Risk and Processing Effects on Banned Pesticide Residue Levels in Nigerian Staple Foods

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ABSTRACT

The use of pesticides has overwhelming advantage to food security but not so much to the environmentalists and toxicologists. Governments of nations or regions have over the years restricted or banned the use of certain pesticides. This work examined the incidence, dietary exposure and risk characterization of some Nigerian-banned organochlorine and organophosphate pesticides in rice, cassava, maize and beans marketed in Kogi state, Nigeria. The extraction of pesticide residues was performed using the Quick, Effective, Cheap, Easy, Rugged and Safe (QuEChERS) technique, and gas chromatography tandem mass spectrometry was used for quantification of the pesticide residues in the samples. The residues detected in order of decreasing incidence were methoxychlor, α-chlordane, γ-chlordane, endosulfan II, dieldrin, aldrin, p,p'-DDE, Δ-BHC (hexachlorobenzene), endrin aldehyde, p,p'-DDD, lindane, p,p'-DDT, and endosulfan sulfate. No assayed organophosphate residue was detected. Methoxychlor and α-chlordane had the highest incidences of 46.88% and 31.25% respectively, while lindane, p,p'-DDT and endosulfan sulfate had the lowest incidence (3.13% in each case). The processing steps applied including cold /warm water washing, soaking and fermentation had various effects on the level of residues ranging from -149% to 100% reduction in level of pesticide, and are recommended. Risk characterization by percentage tolerable daily intake estimation showed that aldrin and dieldrin were detected at concentrations that far exceeds the safety threshold, the hazard index also revealed that Δ-BHC (hexachlorobenzene), lindane, aldrin, dieldrin and methoxychlor were present in staples at levels with potentials to induce chronic toxicity. None detection, low incidence, low concentrations and low hazard index and risk posed by most pesticides in this study is indicative that the ban on these pesticides has been impactful in reducing their use within Nigeria and consequently in averting health challenges associated with their use. Finding them at any level should alert the regulatory agencies to further strategize towards risk mitigation and elimination.

Keywords: food consumption, organochlorines, Nigerian staples, food processing, risk characterization

NSBMB/UPH/EB/046

Growth Performance Of Clarias Gariepinus (African Catfish) Fed With Rhynchophorus Ferrugineous (Red Palm Weavil Larvae) As A Replacement For Fish Meal In Fish Feed.

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ABSTRACT

This work was carried out to determine the potential use of Rhynchophorus Ferrugineous (red palm weevil larva (PWL) to substitute fish meal in fish feed. Nine groups of eight fishes each totaling 72 were given three types of feed. One was feed formulated with 100% PWL, another with 100% fish meal using trial and error method and a commercial fish feed. All feeds were analyzed and administered to the fishes. Proximate analysis of the feed samples showed crude protein composition to be 33%, 36% and 33% respectively. GC-MS results of PWL show high concentration of n-Hexadecanoic acid with a total value of 40.56%, 9-octaenoic acid 25.92%

and octadecanoic acid (stearic acid) with 16.627%.The fishes were given the feeds at quantities weighing 4% of their body weight daily. Highest weight gains were observed in all fishes at week 3 with a value of 101+9.00g for PWL groups, fish meal (FM) groups had 128.0+14.00g, while commercial fish feed (CFF) groups had 124+27.22g. These changes in weight were not statistically significant when compared with each other at $P \geq 0.05$. The CFF group had the highest specific growth rate of 3.20g per day, while FM fish had 3.10g per day. PWL fishes by week three had the highest feed conversion ratio of 1.06+0.13. PWL and FM had mortality rate of 4.00% while the CFF had mortality rate of 0.00%. PWL can be used as alternative to FM in fish diet because PWL fishes had high feed conversion ratio and no significant difference in weight between groups; however, further research can be used to determine if various combined inclusions of FM and PWL would produce better growth performance.

Keywords: Clarias gariepinus, Rhynchophorus ferrugineous fish mea

NSBMB/UPH/EB/047

Bacteriological Assessment and Physicochemical Properties of Ogun River Located Along Iseyin-Ibadan Road, Oyo State, Nigeria.

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ABSTRACT

Water is the most vital element among the natural resources and the most indispensable need for existence of all living things. This study was carried out to investigate bacteriological analysis and physico-chemical parameters of water samples of Ogun river located along Iseyin-Ibadan road, Oyo State. Water samples were collected from three stations on the river. The physico-chemical parameters were determined using Standard Analytical Method and bacteria was determined by using digital colony counter model SUNTEX colony counter 570 and expressed as a colony-forming unit (CFU/ml). Results revealed that pH, Conductivity, TDS, DO, and BOD values from all the stations were within WHO and SON permissible limits while Temperature ranges between (32.5 - 33.1^{o}C), COD (5.63 -5.95 mg/L) and Turbidity (6.06 - 8.32 Ntu) values were above WHO and SON permissible limits. Six pathogenic bacteria were isolated from the water samples namely: and *Corynebacterium kutsceri, Staphylococcus aureus, Corynebacterium xerosis, Clostridium spp, Escherichia coli, Salmonella* spp. This is an indication of some contamination of the Ogun river water. This study on ogun river water from sample A-C has revealed variation in water quality parameter, however few physicochemical parameters were above WHO and SON limit which is an indication of water pollution while the presence of some pathogenic bacteria isolated may leads to water borne disease or an outbreak of disease such as cholera, pneumonia, joint infection, typhoid, polio, diarrohea and so on. Therefore, the water needs to be treated before drinking.

Keywords: Water quality, Parameter Assessment, Bacteria count, Water, TDS, Temperature.

NSBMB/UPH/EB/048

Multiple Contaminants in Seafood and its Health Implications from two Creeks in Bonny Estuary, Rivers State

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ABSTRACT

This work investigated the concentrations of 16 USEPA priority polycyclic aromatic hydrocarbons (PAHs) and potential toxic elements (PTEs) in seafood, and associated human health risk from Orosikiri and Akiama creeks in Bonny estuary, Rivers State. Samples of *Cardisoma guanhumi, Cardisoma armatum, mugil cephalus* and *Oreochromis niloticus* were obtained from Orosikiri and Akiama creeks. PTEs and PAHs concentrations were determined using atomic absorption spectrophotometer and gas chromatograph-flame ionization detector, respectively. The analyzed PTEs were chromium (Cr), cadmium (Cd), arsenic (As), lead (Pb) and mercury (Hg). Results show PTEs concentration (mg/kg) in seafood varied from 0.0898-1.727, 0.013-0.084, 1.582-5.467, 0.002-0.007, 0-0.003, and 1.001-2.798, 0.086-0.311, 3.169-9.312, 0.013-0.086, 0.002-0.015 for Pb, Cd, Cr, As, Hg in Akaima and Orosikiri respectively. The levels of Cr and Pb were significantly elevated in all seafood samples, although lower than the levels of Cd, As and Hg across all sampled locations. Notably, the concentrations of Cr and Pb exceeded the recommended limits set by FAO/WHO which are 2.0mg/kg and 0.5mg/kg respectively. Ars and Hg were below detectable limits (BDL) and this may not be unconnected to the nature of the pollutants in the area. All smoked seafood samples had higher PAHs and Pb concentrations than their corresponding fresh samples indicating an external source of contamination during processing. The concentrations of all PAHs examined in the sampled seafood species were below WHO maximum permissible limit of 0.001mg/kg in fish and shellfish and EC regulation in fish (WHO 2003). Health Risk to humans through dietary consumption of seafood were assessed by estimated daily intake (EDI), target hazard quotient (THQ) and carcinogenic risk (CR). THQ for Pb, Cd, Cr were found to be above the risk-free limit of 1 for all seafood in children population. life cancer risk (LCR) revealed that Cr, Pd, As, and Hg levels in the samples seafood were seen to be above the upper risk-free limits for both adult and children populations exposed to the sampled seafood. Cr had the highest carcinogenic risk level in both adult and children's populations. Low molecular weight PAHs were observed in smoked *Oreochromis niloticus*, Cardisoma armatum from Akiama and fresh Oreochromis niloticus from Orosikiri. Fluorene, Benzo(b)fluoranthene (BbF), Benzo(k)fluoranthene (BkF), Dibenz(a,h)anthracene (DahA), Indeno (1,2,3,-cd)pyrene (InP), benzo(g,h,i)perylene (BghiP) were not detected in all samples analysed. The results showed that LCR values were above the range of probable risk-free limit for PAHs while Total life cancer risk (TLCR) values are in order; Akiama > Orosikiri for the sampled seafood.

Keywords: Polycyclic Aromatic Hydrocarbon, Potential Toxic Elements, Seafood, Contaminants, Orosikiri, Akiama

NSBMB/UPH/EB/050

Assessment of Health Status Using Anthropometric Studies of Persons Occupationally Exposed to Oil Spillage in Bodo, Gokana Local Government Area, Rivers State, Nigeria

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ABSTRACT

Oil spillage poses significant public health challenges, particularly in regions like Bodo, where occupational exposure to such spills is prevalent. This research investigates the health status of individuals occupationally exposed to oil spillage in Bodo, Gokana Local Government area, Rivers State. A total of 93 respondents were enrolled using multistage random sampling techniques. Anthropometric measurements used from the respondent shows population by gender, age, physical health parameters: height, weight and BMI. Health challenges: cardiovascular, kidney, respiratory, diabetes and blood pressure in relation to occupations. Data were analyzed and mean percentage distribution was statistically computed. The study revealed a prevalence of cardiovascular (43.6%), kidney (0.0%), respiratory (2.6%) and diabetes (53.8%) complications. This health defects might be due to the crude oil contaminations in the community. This calls for urgent need for effective reduction strategies to alleviate the impact of oil spillage in Bodo.

Keywords: Oil spillage, Anthropometric studies, Health challenges, Percentage distribution

SUB-THEME 4
INDUSTRIAL

NSBMB/UPH/IB/001

Chemical elucidation and kinetics of Antibiotics production from *Glycine max* (Soybean) seeds by soil *Bacillus* isolates

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ABSTRACT

The present study investigates the metabolic potential of soil *Bacillus* in production of antibiotics from *Glycine max* (soybean) seeds. *Bacillus* species were isolated from soil (1g) on sterilized Nutrient Agar (NA), followed by Gram staining, light microscopy and starch hydrolysis. Dried *G. max* seeds were ground to obtain *Glycine max* seed powder (GMSP). Fermentation of GMSP (10g) was carried out for 192 hours in an Erlenmeyer flask containing 150 ml of sterilized production medium and 10 ml of *Bacillus* inoculum (1.5×10^3 viable cells) using γ-glutamic acid (γ-GA) as control. Time-course of antibiotics (peptide, macrolide and fluoroquinolone) productions in cell-free supernatants was spectrophotometrically monitored every 24 hours using standard protocols, taking pH with a pH meter. Standard Amoxicillin, Erythromycin and Ciprofloxacin were used to determine concentrations of the three respective classes of antibiotics. After 192 hours, cell-free broths were analyzed by Ultraviolet spectroscopy and High Performance Liquid Chromatography (HPLC). Whitish colonies of *Bacillus* species NA plates were positive for Gram staining, with characteristic rod shape and pink coloration. Starch hydrolysis test shows clear zones around the bacterial cells. Highest concentrations of peptide, macrolide and fluoroquinolone antibiotics were found as 117.16 (144 hours), 342.57 (144 hours) and 2584.81 µg/ml (96 hours) in GMSP, against 89.04 (192 hours), 327.96 (192 hours) and 224.45 µg/ml (144 hours) in γ-GA cell-free broths, respectively. The pH values in γ-GA and GMSP cell-free broths were 3.88 ± 0.35 and 6.38 ± 0.74, while the UV values were 202.5nm - 231nm and 201nm – 249.5nm, respectively. The HPLC data show the presence of Poly-gamma-glutamic acid in γ-GA broth, while GSMP broth contained bacillomycin D, surfactin A and 1-Deoxynojirimycin, as major antibiotics. This study demonstrates that soil *Bacillus* species could produce antibiotics via fermentation of *Glycine max* seed powder, which may have both veterinary and clinical applications.

Keywords: antibiotics, soil *Bacillus*, fermentation, *Glycine max* seed

SUB-THEME 5

FORENSIC SCIENCE

NSBMB/UPH/FS/001

Evaluation of phytonutrients and Heavy Metals Contents in Bitter Leaf (*Vernoniaamygdalina*) Locally Cultivated in Wudil, Kano State.

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ABSTRACT

Bitter leaves (Vernonia amygdalina) are consumed for its nutritional and medicinal applications mostly by tropical continents. Evidence of phytonutrient compositions in edible leaves and heavy metal contamination in relation to localized farming system is under reported in nationb archive, This necessitates this research study with the zeal of evaluating the phytonutrient profile and heavy metal content in bitter leaf sample locally cultivated in Wudil town, Kano state. The method of Atomic absorption spectrophotometry was used to quantified heavy metal contents (chromium, nickel, mercury, lead, iron, zinc, copper and manganese), while qualitative and quantitative methods were used to evaluate phytonutrient contents in bitter leaves sample. Evidence from the results analysis generated from heavy metal contents evaluation, the results indicated heavy metal contamination of cadmium and lead in bitter leave sample and these represent a potential health risks. However, essential metals like zinc, iron and copper were also detected. Moreover, evidence from the results analysis generated from phytonutrient content evaluation, the results indicated phytonutrient composition of tannins (79.91mg/g), phytate (263.745 mg/g), alkaloids (14.586mg/g) and steroids (3.038mg/g) in bitter leave sample. Based on this research findings and observations, it is deduced that bitter leaves sample locally cultivated in Wudil town contains cadmium and lead contamination and evidence of potential health risks from cadmium and lead poisoning is inevitable from the bitter leave consumption. However, it can also be deduced that bitter leaves sample locally cultivated in Wudil town are encompassed with range of phytonutrient components which have both nutritional and medicinal applications. Further investigation is needed on contamination sources and processing methods and chemical diversity of phytonutrient. With these efforts, soil contaminations are reduce and holistic nutritional and medicinal potentials of bitter leaves is improve.

Keywords: bitter leaf, phytonutrients, heavy metals, nutrition, health risk.

NSBMB/UPH/FS/002

HPLC Polyphenolic Fingerprinting and Evaluation of the Effect of Methanol Crude Extract of Plantain Flower on Some Pharmacological and Biochemical Parameters

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ABSTRACT

The application of plant materials in health system has enormously grown in importance all over the world for the treatment of numerous diseases in humans. This possibility could be attributed to the presence of vase phytochemicals in plants as reported by array of researchers. This present study was carried out to isolate the bioactive polyphenol compounds of methanol crude extract of plantain flower using High-Performance Liquid Chromatography (HPLC) and to investigate its *in vitro* antioxidant properties, and inhibitory potentials on alpha-amylase, alpha-glucosidase, acetylcholinesterase (ACHE), butylrylcholinesterase (BCHE), and phospholipase A2 (PLA2).. A known mass (500 g) of dried plantain flower was blended and macerated using 3.2 L of absolute methanol for 48 hours (hrs) and then tightly corked in a conical flask. After the expiration of 48 hrs, it was then filtered. The filtrate was further evaporated until constant mass to obtain methanol extract from plantain flower. The crude extract was characterized to identify its active compounds using HPLC as well as other studies. Standard methods were adopted for the enzyme assay. Rivastiginine, prednisolone, acarbose and ascorbic acid were respectively used as standard drugs for the cholinergic enzyme (ACHE and BCHE); PLA2 assay; alpha-amylase and alpha-glucosidase; and antioxidant parameters. Ten peaks were observed in the HPLC polyphenol chromatogram of methanol extract of plantain flower. Six out of these ten peaks were identified as Caffeic acid, Gallic acid, Ferulic acid, Chlorogenic acid, Xanthohumol and Epicatechin with retention time in mins of 1.182, 2.673, 3.882, 4.040, 4.157 and 4.982 respectively. The concentration of each of these identified polyphenols varied with Caffeic acid having the highest concentration (30.2354 mg/10g). In descending order, the concentration varies as follows; Caffeic acid > Gallic acid > Chlorogenic acid > Epicatechin > Xanthohumol > Ferulic acid. In all *in vitro* models, the methanol extract of plantain flower scavenged for free radicals in a concentration-dependent manner except for DPPH radicals. At 225 µg/ml the highest percentage inhibition was observed in FRAP, TAC and H_2O_2 which are 2.127, 64.26 and 64.22% respectively. From the result, the inhibion of alpha amylase, alpha glucosidase, ACHE, BCHE, and PLA2 were dose-dependent. At the highest dose of 225 µg/ml of the extract, the respective percentage inhibition of the enzymes were 49.13 ± 0.07, 50.15 ± 0.01, 70.15 ± 0.05, 50.15 ± 0.01 and 71.35 ± 0.37 which were the highest inhibition of each enzyme by the extract. Perhaps, the bioactivities of plantain flowers could be due to its rich polyphenolic content constituents. Our result, suggests that plantain flower possesses inhibitory potentials against enzymes linked to diabetes, cholinergic dysfunction inflammation.

Keywords: Plantain flower, alpha-amylase, alpha-glucosidase, acetylcholinesterase, butyrylcholinesterase, Phospholipase A2, HPLC

NSBMB/UPH/FS/003

Toxicological evaluation and hypoglycemic effect of alkaloid rich fraction of *Zizphus mauritiana* hydromethanol leaf extract.

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ABSTRACT

Herbal preparations and other crude extracts of *Ziziphus mauritiana* have been report for various bioactivities but few of these preparations phytoconstituents are evaluated separately for their bioactivities. This research work aimed at evaluating the hypoglycemic and toxicological potential of alkaloids rich extract of *Ziziphus mauritiana* leaves. In evaluating of this fraction, hematological analysis was achieved with the extraction of alkaloid fraction using stas-otto method, hypoglycemic parameter was evaluated the glucometer, while heamatological analyzer was employed for heamatological parameters, the liver, kidney function parameters and lipid profile were evaluated using standard test kits. The experimental group exhibited a notable reduction in platelet count, mean platelet volume (MPV), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration (MCHC) but were not statistically significant. Conversely, an increase in red blood cell (RBC) and white blood cell (WBC) counts are statistically significant. Furthermore, liver function tests revealed a significant increase in total protein, aspartate aminotransferase (AST), and alanine aminotransferase (ALT) levels in the experimental group. This indicates a potential effect of the alkaloids fraction on hepatic function. Interestingly, the organ-body weight ratio of the liver showed a decrease in the experimental group, indicating possible constriction of liver mass. The inhibitory concentration of the fraction on alpha-amylase give an indication of potential hypoglycemic effect of the fraction. This result placed in the front burner the possible antidiabetic potential and toxicological effect of alkaloid rich fraction of *Ziziphus mauritiana* leaves and caution needed to be applied in the administration of this extract.

Keywords: hypoglycemic, toxicity, Liver Function Test, Kidney Function Test, alkaloid

NSBMB/UPH/FS/004

Comparative Analysis of Fatty Acids and Cholesterol Contents in Five Industrial Edible Oil Products

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ABSTRACT

Edible oils are one of the essential ingredients of culinary practices worldwide. Hence, research evidence from previous publications had attributed the consumption of edible oil to various health risk implications. This necessitates the undertaken of this research in order to evaluate and comparatively analyzed fatty acids and cholesterol contents in five selected most commonly consumed edible oil samples (King'oil, Power oil, Mamador oil, Turkey oil and Local groundnut oil). The methods of HPLC and Liebermann – Burchard were used to evaluate cholesterol contents, while the method of GC-Mass spectrophotometry was used to evaluate fatty acid contents in the five selected edible oil samples. The results generated from the analysis indicated the presence of cholesterol content within World Health Organization permissible (WHO) standard in all the five tested edible oil samples. The results also indicated higher percentage content of unsaturated fatty acids contents at the range of 73.26 - 84.24% in all the five tested edible oil samples. Moreover, the results also indicated higher PUFA/SFA

ratio value above World Health Organization (WHO) permissible standard in King' s oil (1.27), Power oil (2.28) and Local Groundnut oil (1.30) respectively. Lastly, the results also indicated moderately higher omega-6/omega-3 ratio value above World Health Organization (WHO) permissible standard in all the five tested edible oil samples. In conclusion, based on this research analysis, it deduced that the five tested oil samples were all at cholesterol health risk safety, but evidence of health risk implications in respect to PUFA/SFA ratio for consuming King' s oil, Power oil and Local Groundnut oil samples and omega-6/omega-3 ratio for high consumption in any the five tested edible oil samples are inevitable.

Keywords: edible oil, fatty acids, cholesterol, PUFA/SFA ratio, omega-6/omega-3 ratio, health risk, safety

SUB-THEME 6

ETHNOPHARMACOLOGY

NSBMB/UPH/EP/001

Evaluation of *Ficus platyphylla Dell.* Leaf Methanol Extract for its Acute and Sub-Chronic Toxicity

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Ficus platyphylla is a medicinal plant used in the treatment of many diseases for centuries. The present study was aimed at evaluating the acute and sub-chronic oral toxicity of *Ficus platyphylla* Dell. leaf methanol extract. The acute toxicity test was conducted with according to OECD guideline 423. The extract was administered in a single dose of 3000 mg/kg body weight via oral gavage; and the animals were observed for any behavioral changes or mortality. In the sub-chronic toxicity study, the rats received 10ml/kg b. wt. distilled water as control and three doses of the extract (200, 400 and 600 mg/kg b. wt.) for 28 days via oral gavage. During the 28 days treatment period, the rats were observed weekly for toxicity symptoms. Following the 28-day treatment, the rats were sacrificed for hematological, biochemical and histopathology observations. The results for the acute toxicity study showed that *Ficus platyphylla* extract did not produce any hazardous symptoms or death in the acute toxicity test, showing a LD_{50} higher than 3000 mg/kg. Sub-chronic treatment with *Ficus platyphylla* failed to change any of the analyzed parameter such as body weight gain, hematological and biochemical profiles. In addition, no changes in major histophathological aspects were observed in the liver and kidneys of treatment groups in relation to the control group. The study therefore showed that acute or sub-chronic administration of *Ficus platyphylla* Dell. is not toxic in female Wistar rats, suggesting a safety in humans.

Keywords: acute; *Ficus platyphylla*; leaf; sub-chronic; toxicity; extract.

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Evaluation of Antimalarial Activity of *Senna Alata* and Influence on Hepatic Caspase-3 and Nuclear Factor Keppa B

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ABSTRACT

Malaria remains a major global health concern, necessitating the continuous search for effective antimalarial agents. This study investigates the potential antimalarial activity of *Senna alata,* commonly known as the candle bush, and its impact on hepatic oxidative damage and expression of caspase-3 and nuclear factor keppa B (NF-κB) molecules. Thirty mice, divided

into 6 groups (N=5/gp) were used for the study. Group 1 served as the negative control and received 0.2 mL of normal saline. Groups 2 to 4 constituted the test groups which received doses of 100, 200, and 400 mg/kg of the leaf ethanol extract of *Senna alata* (EESa), respectively. Group 5 served as the standard drug control that received 20 mg/kg of Lonart®DS. Group 6, the naïve group were neither infected nor treated (NINT). Mice were treated for 4 days after confirming parasitaemia following inoculation. At the end of the 6th day post treatment, the animals were euthanized and then, blood samples and liver tissues were collected for analysis using documented methods and standard procedures. Results of the malaria curative test for *Plasmodium berghei* in murine model indicated that EESa significantly ($p<$ 0.05) suppressed parasitaemia in treated groups in a dose dependent manner which compared well with the standard drug treatment. Similarly, EESa improved the mean survival time (MST) and haematological indices of infected mice. Furthermore, EESa significantly reduced the hepatic expression of caspase-3 and NF-κB p65 molecules, suggesting its potential involvement in regulating apoptosis and inflammation in hepatic cells as evidenced by the associated low histological grading. Conclusively, the demonstrated antimalarial activity of EESa protected the liver from the inflammatory and apoptotic damages caused by malarial infection in experimental mice. Therefore, the active phytocompounds in EESa need to be identified for study as lead compound(s) in the discovery of novel antimalarial drugs. Meanwhile, the data from this study support the use of *S. alata* in the traditional treatment of malaria.

Keywords: *Senna alata*, Malaria, Nuclear Factor-keppa B, Parasitaemia, *Plasmodium berghei*, Caspase -3.

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Antimicrobial Efficacy and Cytotoxic Analysis of Leaf Extracts of *Ocimum Gratissimum* (Scent Leaf) on Selected Gastrointestinal Bacteria

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ABSTRACT

This study is aimed at investigating the antibacterial efficacy and cytotoxic analysis of leaf extract of *Ocimum gratissimum* (Scent Leaf) on selected gastrointestinal bacteria. Ethanol was used as extracting solvent for the antimicrobial activity while aqueous extract of the plant sample was used for the cytotoxic analysis. Standard methods were used in this research work. In this study, four (4) gastrointestinal bacteria were used for the antimicrobial activity; *Klebsiella pneumoniae*, *Staphylococcus aureus*, *Salmonella typhi* and *Escherichia coli* while three commercial antibiotics (Nitrofurantoin, Ciprofloxacin and Gentamycin) were used in comparism with the plant extracts at different concentrations. Result from this study revealed that the plant extract at different concentrations were able to inhibit the growth of the selected gastrointestinal bacteria. When comparing the actions of the plant extracts to the commercial antibiotics on the test organisms, they are more effective as high zones of inhibition were measured except for Nitrofurantoin which was higher in action on *Escherichia coli* than the plant extracts. The cytotoxic activity of the plant extract revealed that the higher the concentration of extract, the greater its activity on the root growth of *Allium cepa*. This study therefore, concluded that the leaf extract of *Ocimum gratissimum* could be used to cure diseases

caused by these selected gastrointestinal bacteria. The research findings can further be used by the clinics, pharmaceutical industries and other medical sectors in tackling the menace of the gastrointestinal disorders caused by these bacteria.

Keyword: Antimicrobial, Cytotoxic, *Ocimum gratissimum*, Gastrointestinal bacteria

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Ethnobotanical and Antimalarial Potentials of *Salacia Senegalensis* Leaves

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ABSTRACT

Ethnobotanical and antimalarial potentials of methanol leaf extract of *Salacia senegalensis* were assayed. Ethnobotanical result shows no sensitivity to *Escherichia coli*, *Candida albican* and *Staphylococcus aureus* at 5 µg/ml of the methanol and water extract used. The antimalarial potentials were investigated in albino mice infected with chloroquine-sensitive *Plasmodium berghei berghei* (NK65) using chemosuppressive, curative and prophylactic effects against early, established and residual infection. The extract doses used in the antimalarial studies were 1000 mg, 1200 mg, and 1400 mg /kg body weight of mice per day respectively. Results of the antimalarial effect of methanol extract of *Salacia senegalensis* leaves evaluated in albino mice infected with chloroquine-sensitive *Plasmodium berghei berghei* (NK65) showed a dose-dependent blood schizontocidal activity at all the phases of malarial infection studied. The *in vivo* antimalarial effect of the extract (1000, 1200 and 1400 mg/kg body weight) against *P. berghei* showed significant ($p < 0.05$) dose-dependent activity for suppressive, curative and prophylactic test. When the extract dose increased from 1000 to 1400 mg/kg/day, chemosuppressive activity of the extract increased from 66.47 % to 80.33 %. There was also an increase from 66.57 % to 75.41 % and from 64.90 % to 82.72 % for the prophylactic and curative activities respectively. The schizontocidal activities were comparable to that of chloroquine which had percentage suppression of parasitaemia as 87.03 %, 85.12 %, and 91.68 %, and artesunate which had percentage suppression of parasitaemia as 88.39 %, 86.01 % and 93.83 % for suppressive, prophylactic and curative activities respectively. The percentage mean survival time of the *P. berghei* infected mice treated with extract doses were comparable to that treated with the standard drugs- chloroquine and artesunate. It was thus concluded that the herbal extract possesses significant antimalarial potency which were comparable to these standard drugs and could be exploited in the formulation of antimalarial drugs.

Keywords: Ethnobotany, antimalarial, chemosuppressive, curative, prophylactic

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A Review of Plant Extract-Metallonanoparticles: Synthesis and Applications in Combating Antibiotics Resistance

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ABSTRACT

Antibiotics are synthetic compounds used for treatment of many bacterial infections. In recent times, the problem of antibiotic resistance (AR) has emerged. AR simply implies that bacteria, which were previously susceptible to certain antibiotics have gradually become non-responsive to them; thus, making such antibiotics less efficacious and hence can no longer be used to treat the infection. AR has been attributed to mutation of AR genes, antibiotics misuse and other environmental factors. The issue of AR has become a global concern because it threatens global health, food security, and development. To overcome this challenge, synthesis of nanoparticles (NP) with antibacterial activities have been advocated. NPs are synthesized and adsorbed on metallic salt to produce the corresponding metallic nanoparticles (MNPs) with efficient antibacterial activities. The phytochemicals in the plant extract reduces the metal salt into the corresponding nanoparticle. NP acts by altering the physiology of bacterial cell membrane, leading to its lysis. NPs are non toxic and compatible to humans. This paper is therefore a synopsis of various NPs synthesized from plant extracts and their applications. It recommends among others, strategy for optimized production.

Keywords: *Antibiotics, Antibiotic resistance, Antibacterial activity, Nanoparticle, Plant extract*

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Antiplasmodial and Acute Toxicity Evaluation of the Methanol and Aqueous Extracts of *Gnetum africanum*

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ABSTRACT

The methanol and aqueous extracts of different parts of *Gnetum africanum* plant were studied for their *in vivo* anti-plasmodial activity against chloroquine resistant *Plasmodium berghei* Nk 65 in Swiss albino mice. The LD_{50} of all extracts used were also evaluated to determine the

lethal dose, as to adopt an ideal dosage for the study. The aqueous extract of the stem of *Gnetum africanum* showed the highest antiplasmodial activity. The extract significantly suppressed the parasite. There was a significant difference ($p<0.05$) observed when the level of parasitemia of the animals treated with the aqueous extract of the stem bark of *Gnetum africanum* was compared with the untreated, chloroquine standard control and other treatment groups. Detailed plant acute toxicity testing was carried out on the mice using the methanol and aqueous extracts of the leaves and stems of *Gnetum africanum*. The acute toxicity studies showed no death at 5000mg/kg bw administration of the extract, therefore, the extract is considered to be generally safe. Since *Gnetum africanum* showed very good antiplasmodial activity, it is concluded that this plant has potentials in fighting malaria.

Keywords: Antiplasmodial, Acute toxicity, Swiss Albino mice, *Gnetum africanum*, *Plasmodium berghei*

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Determination of Treatment Potentials of *Nigella Sativa* Oil Against Some Common Bacterial Isolates

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ABSTRACT

Nigella sativa (NS) is commonly known as black seed which belongs to the botanical family of Ranunculaceae. N. sativa seeds have been used for nutritional and medicinal purposes in many Middle Eastern countries and other parts of the world. The aim of this study was to carry out the antibacterial activities of Nigella sativa oil against some common bacterial isolates. The objectives of the study include; the confirmation of the test organisms, the determination of the inhibitory effect of Nigella sativa oil, and MIC and MBC determination. Nigella sativa (black seed) essential oil was studied for antibacterial activity against *Klebsiella pneumoniae, Escherichia coli, Pseudomonas aeruginosa* and *Staphylococcus aureus* using Dimethylsulfoxide (DMSO) as control, the concentration of the oil was varied using serial dilution method, agar disc diffusion method on Mueller Hinton medium was then used for the determination of the antibacterial effect of the test oil. However, the oil showed pronounced dose dependent antibacterial activity which was more against Gram negative bacteria (*Klebsiella pneumoniae, Escherichia coli* and *Pseudomonas aeruginosa*) than Gram positive (statistically significant $p < 0.05$) bacteria (Staphylococcus aureus). Statistically, there was a significant relationship between the Gram positive test organism and the antimicrobial activity of the oil ($p < 0.05$). The gram positive and gram negative bacteria were susceptible to the oil. Furthermore, the Gram negative bacteria showed zones ranging from 10 - 18 mm against *Klebsiella pneumoniae* for concentrations of 60 - 100 %, 11.5 - 17 mm for *Escherichia coli* on 60 - 100 % concentrations, 9 - 11 mm for Pseudomonas aeruginosa on 80 - 10 % concentrations and the Gram positive bacterium showed zones ranging from 11 - 13 mm on 90 - 100 % concentrations. The phytochemical constituents of Nigella sativa oil were also studied which showed the presence of alkaloids, saponins, flavonoids, glycosides and steroids, while tannin was absent. In conclusion, Nigella sativa oil possesses antimicrobial activity against several

multi resistant pathogenic microorganisms and may be used typically in susceptible cases. Further studies are required to advocate it systematic use in infectious diseases.

Keywords: Antibacterial activity, Susceptible, Resistance, MIC, MBC, Gram negative and Gram positive bacteria.

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Larvicidal Activity of Spores and Metabolites Extracts of *Penicillium spp.* Against *Culex Mosquito* Larvae

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ABSTRACT

Fungal metabolites are considered to be effective means of addressing the challenges associated with insecticide resistance and environmental pollution. The current investigation focuses on the assessment of the mosquito larvicidal potential of metabolites and spores of *Penicillium spp*. After cultivating the fungus for five days on Sabaroud Dextrose Agar (SDA), the fungal spores were extracted and spores concentrations were determined by measuring their optical density (OD). The spores activity was tested at four concentrations viz., 4.5×10^8 CFU/ml, 2.25×10^8 CFU/ml, 1.125×10^8 CFU/ml and 0.56×10^8 CFU/ml. However, four distinct test concentrations of metabolites (10, 20, 30, and 40 mg/mL) were extracted using an equal proportion of ethyl acetate and methanol. By using probit analysis, the lethal concentrations (LC_{50} and LC_{90}) of metabolites and spores were determined. The preliminary screening of the metabolites extract of *Penicillium spp.* showed better larvicidal effect at highest concentration (40 mg/mL). A strikingly high death rate (100%) was observed at spores concentration of 4.5×10^8 CFU/ml. GC-MS and FTIR analyses were used to characterize the metabolites chemical constituents were characterized using The major bioactive components of *Penicillium spp*. extract include Caryophyllene, Octadecene, Hexadecanoic acid , Squalene and 3-Eicosene. The outcomes of this unequivocally demonstrated that *Penicillium spp.* derived crude metabolites and spores extracts exhibit larvicidal potency against *Culex* mosquito.

Keywords: Larvicidal**,** *Culex* mosquito**,** *Penicillium spp.*

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Toxicological Effects of Aqueous And Ethanol Extracts of Clove (*Syzygium Aromaticum*) on Various Pathogenic Bacteria

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ABSTRACT

Clove is a highly aromatic spice that comes from the dried flower buds of the clove tree (*Syzygium aromaticum*).It's originated from Indonesia and has been used for centuries in various cuisines and traditional medicine practices around the world.Medicinal plants have been in usage to cure many varieties of illnesses caused by bacteria.Also there are effects of aqueous and ethanol extracts of clove on various pathogenic bacteria with many chemicals and bio active chemical constituents that have pharmacological uses that can be found in many medicinal pants.(Al- Ansari et al.,2019). (*Syzygium aromaticum*) has long been recognized for its antimicrobial properties primarily attributed to its active compound,Eugenol. In this study, investigating the toxicological aimed.Aqueous and ethanol extracts were prepared using standard procedures, and their antimicrobial activities were evaluated against a panel of pathogenic bacteria including Gram-positive and Gram-negative.The agar well diffusion method was employed to assess the antimicrobial activity of the extracts.So,the ethanol extract of *S.aromaticum* showed 25.5mm at 100mg/ml which is the highest value on *Salmonella typhi* and the aqueous extract of *S.aromaticum* was found to be less active,it was active against all the organisms tested,with highest activity on *Salmonella typhi* (23mm at 100mg/ml) concentration. Both the aqueous and ethanol extracts showed MIC at 6.25mg/ml on all the isolates except of aqueous extract against *E-coli* that showed MIC at 12.5mg/ml.While MBC was only carried out on an ethanolic extract of *S.aromaticum* against *Salmonella typhi* and *Staphyococcus aureus* with both on 6.25mg/ml respectively.

Keywords: *Syzygium aromaticum*, Medicinal plant,Minimum Bactericidal Concentration, Minimum Inhibitory Concentration, Toxicological

NSBMB/UPH/EP/010

PHYTOCHEMICAL AND *IN-VITRO* ANTIOXIDANT POTENTIALS OF METHANOL LEAF EXTRACT OF *CRATEVA ADANSONII*

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ABSTRACT

Crateva adansonii is a tropical tree widely distributed in the Northern part of Nigeria which possesses medicinal properties, it is traditionally used in the treatment of urinary disorders, fever and skin diseases. The aim of this study is to determine the phytochemical constituents and antioxidant activity of methanol leaf extract. The phytochemical constituents was carried

out using standard procedures. The antioxidant activity was determined by DPPH, Hydrogen peroxide and FRAP assay. The qualitative phytochemical analysis reveals the presence of alkaloids, flavonoids, phenols, tannins, saponins, terpenoids, steroids and cardiac glycoside. Quantitative phytochemical analysis revealed substantial amount of alkaloids (63.3 ±11.23), terpenoids (52.74±1.52), saponin (55.0±25.0), flavonoids (18.3 ±15.4), steroids (10.2 ±0.61) and cardiac glycoside had the least concentration (2.67±0.03). Similarly, the antioxidant activity shows that the scavenging activity of methanol leaf extract on DPPH showed non-significant (P>0.05) differences compare to vitamin C (standard) at various concentrations (100, 200, 400 and 800µg/ml). Also the scavenging effect of methanol leaf extract on FRAP showed non-significant (P>0.05) difference compare to vitamin C at various concentrations. Furthermore, the scavenging effect of methanol leaf extract on Hydrogen peroxide showed non-significant (P>0.05) difference compare to vitamin C. However, higher percentage of inhibitions was recorded in vitamin C treated test although it was not significant compared to the extract. In conclusion, the results showed that the extract possesses antioxidant activity which is mediated by inhibiting the synthesis of ROS and thus it can be used as potent antioxidant in traditional medicine.

Keywords: antioxidant, scavenging activity, phytochemicals, *Crateva adansonii* and vitamin C.

NSBMB/UPH/EP/011

Pentaclethra macrophylla Extract Attenuates L-NAME-Induced Erectile Dysfunction via Antioxidants and Enzyme Modulation

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ABSTRACT

Erectile dysfunction (ED), often accompanies hypertension. Despite the availability of synthetic drugs, their misuse complicates ED treatment, particularly in cases of L-NAME-induced ED. *Pentaclethra macrophylla* (PM) possesses known aphrodisiac properties and is locally employed to manage both ED and hypertension. Considering the fact that the mechanistic understanding of PM's antihypertensive and erectile effects remains limited, this study aims to elucidate its potential mechanisms in L-NAME-induced erectile dysfunction in rats. Twenty adult male albino rats (weighing 200-250 g) were acclimatized for 14 days and divided into five groups (n=4): Group 1 - Normal control; Group 2 - L-NAME-induced rats fed basal diet; Group 3 - L-NAME-induced rats fed basal diet and treated orally with sildenafil citrate; Group 4 - L-NAME-induced rats fed with 5% *P. macrophylla*-supplemented diet; Group 5 - L-NAME-induced rats fed with 10% *P. macrophylla*-supplemented diet. The experiment spanned 21 days, after which the rats were sacrificed. Brain tissue homogenates were subjected to various biochemical assays including acetylcholinesterase (AChE), monoamine oxidase (MAO) enzyme activities; superoxide dismutase (SOD), glutathione peroxidase and glutathione. Results indicated decreased MAO, AChE, and BChE activities following L-NAME induction, with subsequent restoration upon treatment with 5% and 10% PM extract and sildenafil citrate, respectively. Moreover, PM extract enhanced SOD and GPx activities, elevated GSH levels, and reduced TBARS levels compared to normal and induced

control groups. PM extract's composition, including phytochemicals likely contributes to its attenuation of L-NAME-induced brain damage. This study demonstrates PM extract inhibition of AChE, BChE, and MAO activities alongside antioxidant properties, indicating its potential as a natural agent for managing erectile dysfunction.

Keywords: Hypertension. Aphrodisiacs. Oxidative stress and Neuroprotection

NSBMB/UPH/EP/012

Comparative Evaluation of Bioactive Compounds in *Hibiscus sabdariffa* (*zobo*) Seed and *Citrullus lanatus* Seed Oils

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ABSTRACT

Hibiscus sabdariffa (*zobo*) and *Citrullus lanatus* (watermelon) are commonly consumed in Nigeria with known therapeutic usages by locals. They are known to contain bioactive compounds with potential medicinal properties. This study Comparatively evaluated the bioactive compounds in *Hibiscus sabdariffa* (*zobo*) Seed and *Citrullus lanatus* Seed Oils. The bioactive compounds in *H. sabdariffa* seed oil (HSSO) and *C. lanatus* seed oil (CLSO) were determined using gas chromatographic techniques following standard laboratory procedures. Seventeen bioactive compounds were detected in CLSO which include; pentadecanoic acid, Caryophyllene, Humulene, n-Hexadecanoic acid, 9,12-Octadecadienoic acid (Z,Z)-methyl ester, 9-Octadecenoic acid and beta.-Sitosterol, oxime, 9,12-Octadecadienoic acid (Z,Z)-methyl ester, 2-methoxy-4-(2-propenyl)-acetate), methyl-.beta.-D-thiogalactoside, alpha.-D-Glucopyranoside, phenol and phenolic derivatives while thirty-nine (39) bioactive compounds were detected in HSSO which include; fatty acids, alkanols, esters, phenol and phenol derivatives. This study hence shows that *H. sabdariffa* seed oil (HSSO) has more bioactive compounds than *C. lanatus* seed oil (CLSO), making it a better prospect for medicinal research. Hence, consumption of HSSO and CLSO would be of great value in the maintenance of health with little or no adverse effects.

NSBMB/UPH/EP/013

Bioactive Components and Pharmacological Potential of Alkaloid-Rich Extracts of *Lannea egregia* Shoot

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ABSTRACT

Lannea egregia, a plant species with a rich ethnobotanical history, has garnered substantial interest due to its diverse bioactive components. This study investigated the pharmacological

potential of bioactive components derived from *L. egregia* shoot extracts. Ethanol extract of *L. egregia* shoot (EELS) was studied for secondary metabolites. Subsequently, an alkaloid-rich extract (AELS) was prepared from EELS using an appropriate procedure. The resulting alkaloid extract was profiled for bioactive components using high-performance liquid chromatography (HPLC). The antioxidant activities of the EELS and AELS were investigated using 2,2-Diphenyl-1-picrylhydrazyl (DPPH) radical assay and hydrogen peroxide scavenging activity. The cytotoxicity of the extracts was assessed through the brine shrimp lethality assay (BSLA). Alkaloids, flavonoids, saponins, and terpenoids were detected in the ethanol extract. The EELS exhibited a noteworthy DPPH radical scavenging activity at a median inhibitory concentration (IC_{50}) of 40.93 µg/mL, while the AELS had an IC_{50} of 46.85 µg/mL. In contrast, the AELS (126.85 µg/mL) exhibited the highest hydrogen peroxide (H_2O_2) radical scavenging activity compared with the EELS extract (204.93 µg/mL). Both extracts showed considerable cytotoxic activity, with AELS being less cytotoxic (LC_{50} of 196.85 µg/mL) than EELS (LC_{50} of 09.51 µg/mL). HPLC analysis detected bioactive compounds with proven pharmacological importance, such as atropine, brucine, and caffeine in the alkaloid extract. The study concludes that extracts from *L. egregia* shoots contain various bioactive components with pharmacological relevance and exhibit antioxidant and cytotoxic properties, making them a potent source of new cancer drugs.

Keywords: *Lannea egregia*, Ethanol extract, Alkaloid-rich extract, Antioxidant, Cytotoxicity

NSBMB/UPH/EP/014

Isolation, Purification and Identification of Antimalarial Compounds from *Mucuna pruriens* leaves

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ABSTRACT

Leaves of *Mucuna pruriens* (cowhage or velvet bean) have been used for the treatment of several diseases including malaria. This current study sought to isolate, purify and identify anti-malarial compounds from *M. pruriens* leaves. A stepwise fractionation of aqueous extracts from *M. pruriens* leaves was performed using column chromatography. Collected fractions were continuously screened *in vivo* (27-day post infection) for their ability to cure malaria caused by the activity of *Plasmodium berghei* (NK65 strain). The isolated compounds were further identified via Liquid Chromatography – Mass spectrometry (LC-MS) analysis. The column was sequentially eluded with benzene/methanol (1:1), acetone/methanol (5:3, v/v), ethyl acetate/methanol (19:1, v/v), acetic acid/methanol (1:1, v/v) and methanol/water (9:1, v/v). Five different fractions collected and concentrate yields 0.03, 0.50, 0.21, 2.26 and 0.74 g, corresponding to fractions I – V respectively. Fraction(s) or isolated compound(s) with significant antimalarial activity relative to the crude extract were documented. Antimalarial activity of the most potent fraction was confirmed with parasitaemia count and survival rate in parasitized mice. The level of parasitaemia were significantly ($p<0.05$) reduced to 4.75 % in

Fraction IV and survival time lasted up to day 30 relative to crude extract (19.9 %). On the contrary, all the infected mice treated with fraction I - III and V did not survive the scourge of *P. berghei* parasite up to day 15 relative to negative control (infected untreated). LC-MS analysis of the most potent fraction implicated flavonoids as the possible secondary metabolites. Our data suggests flavonoids as the most potent compound in *M. pruriens* leaves that might be responsible for its antimalarial activities.

Keywords: Malaria, Plasmodium berghei, Phytochemicals, Parasitaemia, Mucuna pruriens leaves

NSBMB/UPH/EP/015

Optimization of Solvent Extraction for Phytochemical Profiling of *Dacryodes edulis* Leaves: Implications for Global Health and Green Economy

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ABSTRACT

Dacryodes edulis, or African bush pear is used in African cuisine and traditional medicine for diabetes, malaria, hypertension, and other ailments. This study aims to optimize solvent extraction for the phytochemical profiling of *Dacryodes edulis* (*D. edulis*) leaves, considering its significance for both global health and green economy initiatives. Ethanol was utilized for the extraction, followed by fractionation with solvents of increasing polarity. Qualitative and quantitative analyses revealed diverse phytochemical components, emphasizing the potential therapeutic value of this natural resource for global health. The ethanol extract and ethyl-acetate fraction exhibited high concentrations of bioactive compounds, highlighting their promise for pharmaceutical applications. Notably, the ethyl-acetate fraction demonstrated significantly higher ($p < 0.5$) antioxidant activity, which could have implications for combating oxidative stress-related diseases. Microbial resistance was observed against the ethanol extract underscoring its potential as a natural antimicrobial agent, aligning with efforts to combat antibiotic resistance and promote global health. Gas chromatography-mass spectrometry identified significant compounds such as Silane, [(3, beta)-lanosta-9(11), 24-dien-3-yl]ox and 9,19-cyclolanost-23-ene-3,25-diol, 3-acetate. The aqueous ethanol fraction was higher in 1,2,4-benzenetriol, acetic acid and 3-hydroxy-6-isopropenyl-4,8a-dimethyl-1,2,3,5,6,7,8,8a octahydronaphthalen-2-yl ester. The ethyl-acetate fraction was high in 1,2,3-benzenetriol and ethanol,2-butoxyl while n-hexadecanoic acid, hexadecanoic acid and ethyl ester were higher in the hexane extract. These findings underscore the effectiveness of ethanol and n-hexane as optimal solvents for extracting secondary metabolites from *D. edulis* leaves, offering sustainable solutions for global health challenges. Thus, these findings not only contribute to

understanding the therapeutic potential of these *D. edulis* leaf extracts but also promote sustainable practices in drug development, aligning with the principles of the green economy.

NSBMB/UPH/EP/016

Extract of Teak Leaf (*Tectona Grandis)*, an Alternative Broad Spectrum Antibiotic Product to Selected Over-the-Counter Antibiotic Drugs

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ABSTRACT

Rising cases of microbial infections globally is a great call for concern. Some of the infectious diseases studied so far keep changing pathogenetically and symptomatically a situation that makes some microbes become highly resistant to drugs. The spread of such bacterial resistance is caused by the indiscriminate and inaccurate use of antibiotics. Over-the-counter antibiotic drugs are being used over the years but these are not without triggering other medical conditions in the users due to contraindications and side effects. This research work compares the spectra of antibiotic activities of the crude extract of teak leaf, *Tectona grandis*, a plant with a high ethnopharmacological importance, collected in Bali metropolis, Taraba State, Nigeria, on 6 selected pathogenic bacteria with those of 5 over-the-counter antibiotic drugs.Susceptibility of 6 pathogenic bacteria (3 Gram positive; *Staphylococcus aureus*, *Streptococcus pneumonia* and *Streptococcus pyogenes*, and 3 Gram negative; *Escherichia coli*, *Klebsiella pneumonia* and *Pseudomonas aeruginosa*) to *T. grandis* extracts was compared with their susceptibility to 5 over-the-counter antibiotic drugs (Ciprofloxacin, Chloramphenicol, Amoxicillin, Ampicillin and Azithromycin. Agar well diffusion method was employed, using dimethyl sulfoxide (DMSO) as control. Zones of inhibition were measured in millimeter (mm) and the result compared with the Karby-Bauer antimicrobial chart. *Staphylococcus aureus* was resistant to amoxicillin, ampicillin and ciprofloxacin while moderate sensitivity was recorded to azithromycin and high susceptibility to chloramphenicol. The resistance to amoxicillin and ampicillin is not unconnected to the strain of *Staph. aureus* used, Methicillin Resistant *Staphylococcus aureus* (MRSA). To *T. grandis* extract, there was moderate susceptibility of *Staph. aureus*. *Streptococcus pneumonia* and *S. pyogenes* are Group A Streptococci and they both demonstrated high susceptibility to all the antibiotics including *T. grandis* extract. Higher susceptibility to the plant extract was recorded in the latter with 26.0mm. *E. coli* was sensitive to all the tested antibiotics; highest sensitivity was seen in azithromycin with 26.3mm while the least was observed in chloramphenicol with zone of 16.4mm. Moderate sensitivity to *T. grandis* at 19.5mm was also observed. *Klebsiella pneumonia* on the other hand demonstrated high sensitivity to ciprofloxacin with 23.8mm, moderate sensitivity to chloramphenicol, azithromycin and the leaf extract with high resistance being observed against amoxicillin and ampicillin at 6.3mm and 8.8mm respectively. Same was observed in *Pseudomonas aeruginosa* against other antibiotics except in ciprofloxacin and moderate sensitivity to the leaf extract with 18.2mm was observed.Considering the results of the research work, extract of the leaf of *T. grandis* is a potential broad spectrum antibiotic as moderate to slightly high susceptibility was recorded in all the test pathogens. It is also a safer alternative to over-the-counter antibiotic drugs because it is a natural product. Meanwhile, further research should be conducted to ascertain the correct concentrations, lethal dosage/therapeutic index and the possibility of synergistic activities with other natural products with antibiotic activities.

Keywords: Microbial resistance, Antibiotics, *Tectona grandis*, Ethnopharmacology

NSBMB/UPH/EP/017

Suppressive Activity of Ethanol Leaf Extract of *Conoclinium coelestinum* in *Plasmodium berghei* Infected Mice

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ABSTRACT

Antimalarial medication resistance has emerged as a major global issue and continues to expand. It is now necessary and vital to search for antimalarial drugs with greater potency. Therefore, utilizing established techniques and recorded protocols, the suppressive efficacy of ethanol leaf extract of *Conoclinium coelestinum* was assessed in this study. Study animals were grouped into six groups of six mice each. Group I (neutral control) received no treatment, Group II (negative control) was infected with *Plasmodium berghei* (Pb), but not treated, Group III (positive control) was infected and treated with a standard medication Artesunate, and Groups IV - VII were infected and treated with three different doses (250, 500, and 1000 mg/kg) of the extracts respectively. The treatment commence 1hr after induction with Pb, for a duration of 3days. At the conclusion of the study period, blood samples were taken from the caudal vein, thin blood smears were made, stained using Giemsa staining technique and examined under a microscope. The percentage suppression of parasitemia was calculated using the reported parasitemia levels at each dose in the infected control and test animals. The increase of parasitemia was greatly inhibited by the extract, based on the results (P<0.05). In comparison to the negative control, these suppression were 43.5%, 57.97%, and 65.08% for 250, 500, and 1000 mg/kg of the extract, respectively. This study corroborate the use of *C. coelestinum* in Nigerian traditional medicine by confirming its plasmodia suppressive effect.

Keywords: Malaria, *Plasmodium berghei, Conoclinium coelestinum*, Antimalarial

NSBMB/UPH/EP/018

Evaluation of Bioactive Compounds, *In-Vitro* Antioxidant and A-Amylase Inhibitory Capacities of *Acalypha Godseffiana* Leaf Extracts

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ABSTRACT

Medicinal plants have beneficial properties used for the management of various diseases including diabetes mellitus (DM) together with being source of new drugs in conventional medicine. This study was aimed at assessing bioactive constituents, in-vitro antioxidant and anti-amylase capacities of Acalypha godseffiana leaf extracts. The plant's leaves were extracted using distilled water, ethanol and methanol as a solvent, followed by estimation of bioactive compounds as well as antioxidant and α-amylase inhibitory activities of the leaf extracts. The results showed percentage yields of 18.86 %, 4.10 % and 5.31 % respectively, with the presence of important compounds such as flavonoid, saponins, phenol, proteins and alkaloids at varying quantities. Relative to the standard antioxidant compound used in the study, the leaf extracts possessed moderate in-vitro antioxidant capacity with a pattern that suggests methanol as the best extracting solvent in this regard. Also, findings from this study revealed low α-amylase inhibitory potential with the aqueous leaf extract having the best activity. These properties observed in the plant's leaves are therapeutically useful against DM and can be attributed to the constituent bioactive compounds. Thus, this study provided new insights on the medicinal significance and application of this plant's leaves in the management of DM.

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Assessment of Anti-Ulcer Activity of Ethanolic Leaf Extract of *Conoclinium coelestinum* in Wistar Rats

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ABSTRACT

In addition to being linked to serious side effects such bleeding, perforations, gastrointestinal blockage, and cancer, gastric ulcers are a significant global public health concern. Throughout Nigeria, *Conoclinium coelestinum* is frequently used in traditional medicine to treat inflammation and stomach ulcers. The goal of the current study was to assess the anti-gastric ulcer potential of *C. coelestinum* leaf ethanolic extracts in Wistar rats. Six groups of six rats each were created by random selection. Group I, which served as the neutral control, received distilled water; Group II, which served as the negative control, received indomethacin at a dose of just 40 mg/kg; Group III, which served as the positive control, received indomethacin and omeprazole; and Groups IV through VII, which received three different doses (300, 600, and 1200 mg/kg) of the extracts along with indomethacin. Over the course of 10 days, the extracts' suppressive, curative, and preventive effects were evaluated. Using a stomach ulcer model generated by indomethacin, the in vivo anti-gastric ulcer effects of different extract dosages were ascertained. When comparing the extract to the control, there was a dose-dependent increase in stomach wall mucus ($p < 0.05$). Significant ($P < 0.001$) ulcer inhibition was observed eight days prior to therapy with the extract at the different doses (300, 600, and 1200

mg/kg). The results of this study confirm the traditional use of *C. coelestinum* leaf in the treatment of stomach ulcers. The ethanolic extract of the plant showed a promising anti-gastric ulcer activity in the suppressive, curative, and preventative assessments.

Keywords: *Conoclinium coelestinum*, Ulcer, Indomethacin, phytochemicals

NSBMB/UPH/EP/020

Biolarvicidal Potential of Chloroform Extract of Citrus Cinensis Peel Against Anopheles Mosquito Larvae

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ABSTRACT

The quest for alternatives to chemical based insecticides due to their disadvantages and setbackshas raised inquires on various plant products for potential ability to produce larvicidal effect. This present study was carried out to evaluate the larvicidal potential of chloroform extract of sweet orange (Citrus sinensis) peel against fourth instar larvae of Anopheles mosquito, at various concentrations of 150, 300 and 450µl, over different intervals of 24, 48 and 72 hours . The larval percentage mortality of Citrus sinensis chloroform extract observed over time interval of mortalities of 24, 48 and 72 hours is as follows; For 150µl concentration: 16%, 24% and 40% respectively, while for 300µl concentration: 28%, 44% and 68% respectively, and for 450µl: 52%, 72% and 92% respectively. Additionally, the phytochemical screening of these extracts revealed the presence of alkaloids, flavonoids, glycosides, phlobatannins, saponins, steroids and terpenoids in the chloroform extract. Citrus sinensis peel exhibited larvicidal activity and these results indicate promising approaches against anopheles mosquitos. Hence, chloroform extract of Citrus sinensis peel can be considered as a mosquito larvicide control agent that does not cause pollution to the environment, does not affect non-target organisms and rarely brings about resistance.

Keywords: Citrus sinensis, Anopheles mosquito, Biolarvicide, phytochemicals

NSBMB/UPH/EP/021

Assessment of Antibacterial Potency of *Moringa oleifera* Root bark Pills Crude Extracts on Clinical Isolate in Urinary tract infected patient

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ABSTRACT

The antibacterial activity of *Moringa oleifera* root bark pill crude extract on some bacteria including *Staphylococcus aureus* and *Escherichia coli* using agar well diffusion technique was assessed. The findings revealed that the crude extract had antibacterial effect on all the tested organisms. Inhibition zones of 18 mm and 16 mm were observed for *Staphylococcus aureus* and *E. coli* respectively. Also, the extract had more antibacterial property on *Staphylococcus aureus* when compared to that of *E. coli*. However, antibacterial agents could be formulated from root bark pill of *Moringa oleifera* that can be used in the treatment of diseases caused by the bacteria under study.

Keywords: Agar well diffusion, antibacterial property, bacteria, *Moringa oleifera*, extract.

NSBMB/UPH/EP/022

Effects of Methanol Leaves Extract of Guava, Pawpaw and Yellow Acacia on Biochemical and Hematological Parameters of Albino Rats Infected with Streptococcus pneumoniae

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ABSTRACT

The research focused on the qualitative phytochemical screening of methanol extracts from three distinct medicinal plants: guava, pawpaw, and yellow acacia (Acacia spp.). The study revealed the presence of various phytoconstituents, including tannins, saponins, flavonoids, alkaloids, phenols, cardiac glycosides, reducing sugars, and uniquely, coumarins in yellow acacia. These compounds are known for their potential therapeutic efficacy, particularly in antimicrobial and antioxidant activities. The extracts' antimicrobial properties make them promising candidates for medicinal applications. The research also delved into the impact of these plant extracts on hematological parameters and liver indices in rats over a 21-day period. The study observed that increasing doses of the extracts resulted in elevated levels of hematology parameters. However, groups treated with higher doses showed a significant decrease in these values compared to the control group. The extracts were found to impact parameters such as packed cell volume (PCV), red blood cells (RBC), white blood cells (WBC), hemoglobin (Hb), mean corpuscular volume (MCV), and mean corpuscular hemoglobin concentration (MCHC). Furthermore, the extracts' effects on liver indices were examined, including protein levels, superoxide dismutase (SOD) activity, catalase (CAT) activity, and malondialdehyde (MDA) levels. The extracts led to decreased values of these parameters with increasing doses, suggesting potential interactions with liver function and oxidative stress. The presence of bioactive compounds, such as polyphenols and flavonoids, in the extracts could contribute to their antioxidant properties and enhancement of rats' antioxidant defenses through increased SOD and CAT activities.

Keywords: Streptococcus pneumoniae, Phytochemicals, Hematological parameters, Biochemical parameters

NSBMB/UPH/EP/023

DNA Barcoding in the Identification of Nigeria's Wild Plant Species

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ABSTRACT

The use of DNA barcoding in the identification of plant species has gained popularity over the last decade in Africa. The problem of illegal trading has been a major threat to loss of biodiversity resources. Illegal traders traffic endangered species in their powdered form making it difficult for identification. Some extinct wild flora species were without prior genetic identification and characterization. One of the most efficient techniques to identify and conserve plant species is DNA barcoding which identifies all life-forms of plant species. In this study, DNA barcoding tool was applied to identify 8 wild plant species in Nigeria. The barcode region used in the identification of the selected plant species was rbcl gene. DNA sequence barcodes were generated and used to query the NCBI Genbank. The results showed that the rbcl barcode was able to identify 6 out of the 8 plant species sampled in this study down to their specie level while the remaining 2 were identified to their genus level. The identity of all the sampled plants was successfully authenticated by Genbank with over 99% identity. This further promotes the use of DNA barcoding technique for proper identification, conservation and authentification of endangered plant species.

Keywords: DNA Barcoding, rcbl, Plant species, Poaching, Genbank, PCR

NSBMB/UPH/EP/024

Prevalence of Voltage Gated Sodium Channel Mutation Responsible for Knock-Down Resistance (*kdr*) in Anopheles Mosquitoes

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ABSTRACT

Insecticide resistance has been a major challenge that limits the efficacy of control methods in the malaria vector. Understanding species composition and their resistance status towards the major insecticides being used for vector control will greatly contribute to overcoming these phenomena. The knockdown resistance (*kdr*) causes resistance to DDT and pyrethroids, as a result of a mutation in the voltage-gated sodium channel (*VGSC*), the target site of the insecticides. This study was aimed at studying the prevalence of mutation in the *VGSC* gene of mosquitoes collected from the field. Reared adult Anopheles mosquitoes were subjected to CDC bottle insecticide (DDT) bioassay, it was observed that there is a high resistance to the

tested insecticide with only 53.9% mortality which signifies a high level of resistance based on WHO's recommendation that <80% mortality suggest resistance to the tested insecticide. Resistant mosquitoes at the end of the bioassay were morphologically identified and sorted based on their sex where 34.1% turned out to be females while the remaining 65.9% were all males. DNA was extracted using the Qiagen DNA extraction kit. The mosquitoes were identified using a species-specific PCR. *Kdr* sensitivity/resistance allele genotyping PCR was also carried out. All the identified mosquitoes were *Anopheles arabiensis* with the presence of the *kdr* allele at a frequency of 0.75. The high frequency indicates prevalence of VGSC mutation in Anopheles population in the studied area

Keywords: Anopheles, Insecticide, Mosquito, Resistance.

NSBMB/UPH/EP/025

Comparative Analysis of Vitamin, Mineral and Phytochemical Composition of *Justicia carnea, Mucuna pruriens* and their Combined Aqueous Leaf Extracts

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ABSRACT

Justicia carnea (Acanthaceae) and Mucuna pruriens (Fabaceae) leaves are used separately in traditional medicine for diverse therapeutic benefits and both possess anti-anaemic effects. This study was undertaken to compare the vitamin, mineral and phytochemical compositions of *Justicia carnea, Mucuna pruriens* and their combined aqueous leaf extracts. The analysis were carried out using standard biochemical methods. Vitamin analysis showed that Vitamins B1, B2, B6, B9, C and E were significantly higher ($p<0.05$) in *Justicia carnea* (1.41 mg/g, 2.34 mg/g, 0.07 mg/g, 0.78 mg/g, 27.68 m/g and 0.29 mg/g respectively) than in *Mucuna pruriens* (0.31 mg/g, 1.14 mg/g, 0.04 mg/g, 0.05 mg/g, 4.55 mg/g and 0.23 mg/ respectively) and combined extract (0.75 mg/g, 1.51 mg/g, 0.04 mg/g, 0.36 mg/g, 12.83 mg/g and 0.24 mg/g respectively. Vitamin A was significantly higher in *Mucuna pruriens* (4.61 µg/g) than in *Justicia carnea* (2.81 µg/g) and combined extract (3.27 µg/). In the Mineral analysis, there was no significant difference ($p<0.05$) in the composition of the minerals in all the extracts except Calcium which was significantly higher in *Mucuna pruriens.* The phytochemical analysis showed no significant difference in the Tannin, Oxalate and Phytate composition of the three extracts; Terpernoid and Alkaloid were significantly higher ($p<0.05$) in *Justicia carnea* while Flavonoid and Phenol were significantly higher ($p<0.05$) in *Mucuna pruriens*. Saponin was significantly higher ($p<0.05$) in the combined extract. Alkaloid was not detected in *Mucuna pruriens.* These findings indicate that Vitamin, Mineral and phytochemicals are found more in the extracts when used separately than in their combined form.

Keywords: *Justicia carnea, Mucuna pruriens*, combined extract, Vitamin, Mineral, Phytochemical

NSBMB/UPH/EP/026

Evaluation Of In-Vitro Anti-Diabetic Activities Of Biosynthesized Silver Nanoparticles(Agnps) Of Methanol *Abrus Precatorius* Leaf Extract

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ABSTRACT

Diabetes mellitus is a common chronic systemic disorder characterized by hyperglycaemia as a standard feature. The study is aimed at investigating the in-vitro anti-diabetic activities of biosynthesized silver nanoparticles (AgNPs) from methanolic extract of *Abrus precatorius* leaf. The qualitative and quantitative phytochemical screening of the methanolic crude extract and silver nanoparticles synthesized extract of *Abrus precatorius* were carried out.The biosynthesized AgNPs-*Abrus precatorius* was characterized by SEM and UV-visible spectroscopy andthe antidiabetic activity was evaluated using alpha-amylase. The phytochemical analysis both crude extract and AgNPs-*Abrus precatorius*extract showed the presence of tannin, phenols, alkaloids, saponin, flavonoid, terpenoids, cardiac glycosides, and reducing sugar exceptphlobatanin and anthraquinone that were absent in the AgNPs-*Abrus precatorius*. The quantitative phytochemical analysis shows the abundance of tannin and phenol in the crude extract of *Abrus precatorius* (115.87±0.26 and 81.31±0.19) respectively and in the biosynthesized AgNPs (91.00±0.30 and 63.86±0.2). The characterization of biosynthesized AgNPs-*Abrus precatorius* methanol extract showed that the UV-visible spectrum had a major peak at 400nm and SEM revealed the spherical shapes that are attributed to the biosynthesized AgNPs. The IC50 values of biosynthesized AgNPs -*Abrus precatorius* methanol extractwas 45.36 on alpha-amylase inhibitory analysis. This study suggests that AgNP scan be synthesized from *Abrus precatorius* methanol extract and it has prominent antidiabetic activity by inhibiting alpha-amylase enzymes.

Keywords: Diabetics, *Abrus precatorius*, Alpha-amylase, Antidiabetic, Biosynthesized, Silver nanoparticles

NSBMB/UPH/EP/027

Acute and Sub-Acute Toxicity of Fractions of *Spondias mombin* and *Detarium microcarpum* Stembark in Wistar Rats

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ABSTRACT

Several bioactive compounds in medicinal plants are known to possess therapeutic properties used by mankind for the treatment of various ailments. The medicinal value of such plants signifies a great potential for the discovery and development of new pharmaceuticals. The global rise in the use of medicinal plants has over the years raised concerns for their consumption due to the lethal effects on health when not properly administered. This has led to toxicity studies of various medicinal plant materials to determine their safety. This study was aimed at determining the acute and sub-acute toxicity effects of the dichloromethane fraction of *S. mombin* and methanol fraction of *D. microcarpium* stembarks. The bioactive constituents of the plants were first obtained using dichloromethane and methanol as the respective extracting solvents. Fractions obtained were subjected to acute and sub-acute toxicity studies using standard protocols in sets of Wistar rats. Indices of liver function (alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, total protein, and total bilirubin), kidney function (creatinine, urea, and electrolyte balance) and *in vivo* antioxidants were determined. The results from both studies disclosed that the rats administered with various doses of the fractions exhibited non-significant changes in the above-stated parameters and were relatively comparable to those of the normal control rats. Findings from this study indicate that the dichloromethane and methanol fractions of *S. mombin* and *D. microcarpium* are respectively non-toxic, supporting the local claims of their uses.

Keywords: *S. mombin, D. microcarpium,* Acute Toxicity, Sub-Acute Toxicity

NSBMB/UPH/EP/028

Effects of Co-Administration of N-Acetyl-L-Carnitine, Vitamins A and E on Some Redox Sensitive Biomarkers in Spleen of *Plasmodium Berghei* Infected Mice

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ABSTRACT

On account of emergence and spread of antimalarial drugs resistant parasites in sub-Saharan Africa, the need to search for alternative antimalarial medications is indispensable. In the present study, the effects of co-administration of three (3) antioxidants on spleen of *P. berghei* infected mice was evaluated. Fifty six (56) mice weighing 21-34 kg were randomly allocated into 8 groups of seven mice each: Normal control (NC), Infected untreated (IUC), uninfected treated 28.57mg/kg BW N-acetyl-l-carnitine (UAC), Infected treated 28.57mg/kg BW N-acetyl-l-carnitine (IAC), infected treated 28.57mg/kg BW N-acetyl-l-carnitine and 75mg/kg BW Vitamin E (IACE), infected treated 28.57mg/kg BW N-acetyl-l-carnitine and 11.43µg/kg BW Vitamin A (IACA), infected treated 28.57mg/kg BW N-acetyl-l-carnitine, 11.43µg/kg BW

Vitamin A and 75mg/kg BW Vitamin E (IACAE) and infected treated 5mg/kg BW Chloroquine (ICQ). Treatment lasted 3 days and mice were euthanized with chloroform and sacrificed 6 days' post infection. Blood and spleens were collected for biochemical examinations. Administration of the four treatments to *P. berghei* infected mice had significantly ($p<0.05$) reduced the level of terminal parasitemia. IACAE treatment had significantly ($p<0.05$) restored *P. berghei* infection-induced decrease in superoxide dismutase activity, glutathione peroxidase activity and glutathione level to near normal. Although *P. berghei* infection significantly ($p<0.05$) raised MDA level, the IACE, IACA and IACAE treatments had significantly ($p<0.05$) lessened the infection-induced alterations. Based on the findings, it was concluded that co-administration of N-acetyl-l-carnitine, vitamins A and E could confer suppressive-antiplasmodial effect and averts oxidative stress during *P. berghei* malaria in mice.

Keywords: Antioxidants, *P. berghei*, spleens, treatment and malaria

NSBMB/UPH/EP/029

Total Aflatoxins Proximate Composition Vitamins Phytochemicals And Mineral Element Contents of Peanut (Arachis hypogaea): A Comparative Study of Varieties

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ABSTRACT

Peanut (Arachis hypogaea) is a leguminous plant whose seed has high nutritional and commercial value due to the presence of fatty acids, carbohydrates, vitamins, calcium and various phytochemicals. This study aims to compare the levels of total aflatoxins (B1, B2, G1 and G2), proximate compositions, vitamins, phytochemicals and mineral element content in four varieties of peanuts locally called Kwankwasiyya (PK), Farar Sabayya (PF), Mai Bargo (PM) and Yar Dakar (PY) obtained from Dawanau International grains market Kano, Nigeria. Results show PY had the highest (6.60±0.00ppm) total aflatoxin levels while PM recorded the lowest (5.9±0.00ppm) levels. Likewise, there is a significant difference ($p<0.05$) in terms of moisture, ash, fiber, total fat, protein and carbohydrate compositions across all varieties. Vitamins (B1, B2, B3, B6 and E) have also been evaluated and significant difference also exists ($p<0.05$) in all the varieties with B3 (Niacin) and Vit E (tocopherol) predominantly present in high amounts compared to other vitamins evaluated. Oxalate and phytate are classified as antinutritional phytochemicals. These two were quantitatively measured using standard method. The mean values of oxalate ranges between 1.73±0.32mg/l and 2.30±0.11mg/l for PY and PF respectively. Phytate ranges between 0.163±0.002% and 0.267±0.11% for PK and PF

respectively indicating statistical significant difference ($p<0.05$). Ca levels range between 5.418±0.001mg/kg and 24.087±0.08mg/kg in PY and PK respectively. The lowest levels of Mg were found in PY (24.56±0.00mg/kg) while PK has the highest (59.039±0.00mg/kg) Mg content. Highest levels of K (292.482±0001mg/kg) were found in PY and the lowest (256.763±0.76mg/kg) were recorded by PM whereas Na was highest (7.747±0.002mg/kg) in PF and lowest (7.099±0.001mg/kg) in PY. The overall result obtained in this study revealed that significant differences exists in terms of nutritional and antinutritional compositions present in the studied varieties and high levels of Vitamin E can serve as a good source of antioxidants.

Keywords: Peanut, total Aflatoxins, proximate composition, vitamins, phytochemicals.

NSBMB/UPH/EP/030

Novel approach for the Identification of 2-Pyrolacetic Acid as a Potential Inhibitor of *Plasmodium falciparum* Photosensitized Iodonaphthalene1 (INA) Azide Labelled Protein (PhIL1)

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ABSTRACT

Plasmodium falciparum causes the deadliest form of human malaria, affecting millions of lives each year, particularly those of young children in sub-Saharan Africa. The rapid emergence of drug resistance has stressed the urgent need to develop novel antimalarial therapeutics. An attractive target for antimalarial intervention development is the erythrocyte invasion by *Plasmodium falciparum* merozoites which is powered by the glideosome machinery that is anchored to the inner membrane complex (IMC) and characterized by a well-organized network of proteins, one of which is Photosensitized Iodonaphthalene1 (INA) azide labelled protein (PhIL1). The absence of this essential machinery and associated proteins makes them an attractive target for antimalarial intervention development. In this study, soluble PhIL1 was expressed in bacterial expression system and was purified to apparent homogeneity using chromatographic techniques. Our attempt to crystalize PhIL1 for onward three-dimensional structure elucidation was not successful. However, a non-functional approach was used to screen marine extracts and identified 2-pyrolacetic acid as a potential inhibitor of the protein. This compound could serve as a crystallization chaperone for crystallization of PhIL1 and eventually aid in its structure elucidation that would eventually pave the way for structure guided drug discovery.

Keywords: Malaria, *Plasmodium falciparum*, PhIL1, 2-Pyrolacetic Acid

NSBMB/UPH/EP/031

In Vivo Study on the Hepatotoxicity and Toxic Effects of Sudan III Adulterated Palm Oil on the Lipid (Cholesterol) Profile, Body and Organ Weight of Male Albino Rats

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ABSTRACT

Food adulteration, the deliberate modification of food quality by adding substances is a common practice amongst marketers for economic gain. Unfortunately, there are rumors that palm oil, is being adulterated with Sudan III dye by producers to maximize profits and increase the quantity of palm oil. Sudan III dyes have been shown to induce certain cancers related to the liver, but few studies have been done to show their impact on cardiovascular health. This report focuses on the hepatotoxicity and effects of Sudan III dyes on total cholesterol levels, body and liver weight of thirty male albino rats grouped into five according to their weight and treated as group 1 (control), group 2 which received 0.1 mL of unadulterated palm oil orally, and groups 3, 4, and 5 which received 0.1 mL of 10, 30, and 50 mg/kg bodyweight of Sudan III self-adulterated palm oil respectively for fourteen days. Their body weights were measured on days 0, 7 and 14, after which the rats were sacrificed, with their blood and liver samples taken for biochemical and histopathology analysis. Total cholesterol levels were measured in order to evaluate lipid profiles. The treated animals did not show signs of weight gain, and histology findings showed no signs of apparent liver damage. Rats given both high and low concentrations of Sudan III had significantly higher serum cholesterol levels ($P < 0.05$) than the control group, indicating a risk of cardiovascular disease. Thus, the use of Sudan III adulterated palm oil should be avoided.

Keywords: Food, Adulteration, Quality, Palm oil, Cholesterol

NSBMB/UPH/EP/032

Effect of Costus Afer Leaf Juice on Haematological Indices of Testosterone-Induced Benign Prostatic Hyperplasia in Wistar Rats

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ABSTRACT

This research investigated the effects of Costus afer leaf juice on some haematological indices of testosterone-induced benign prostatic hyperplasia in wistar rats. Benign Prostatic Hyperplasia (BPH) is a non-cancerous enlargement of the prostate gland. It's a common

condition that affects men, particularly as they age. Benign Prostatic Hyperplasia was induced subcutaneously with Finasteride at 50mg/kg body weight. A total of 30 wistar rats were randomly assigned into six (6) groups of five (5) rats each. Groups 1 and 2 served as the negative and positive controls receiving water and testosterone propionate respectively. Groups 3, 4 and 5 received 10%, 20% and 30% respectively of costus afer leaf juice, and Group 6 served as BPH + Finasteride, a standard drug for 28days. The results showed significant increases ($P<0.05$) in HB, RBC, WBC and HCT concentrations when compared to the control group. The above results showed that the costus afer leaf juice was effective in improving the haematological indices of the studied wistar rats.

Keywords: Costus Afer, BPH, Haematology, Finasteride,

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Identification, Characterization and Quantification of Lipid Peroxidation Products in Re-Used Deep Fried Vegetable Oil From Fast Food Vendors in South Eastern Nigeria

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ABSTRACT

Daily consumption of highly oxidized products of fatty acids from re-used deep fried vegetable oil via the intake of ready-made deep-fried fast foods leads to accumulation of lipid peroxidation products which are capable of distorting most biochemical homeostasis, with severe health complications such as cardiovascular disorders and vascular inflammatory diseases. The aim of this research work is to identify, characterize and quantify the presence of cytotoxic lipid peroxidation products in re-used deep fried culinary oil collected from different fast food vendors within (Enugu, Ebonyi, Anambra, Abia and Imo) States in Eastern Nigeria. Hundred millilitre (100 mL) of re-used deep fried vegetable oil collected from different fast food vendors within States, were subjected to characterization, and further identification and quantification of lipid peroxidation products level using thiobarbituric acid reactive substances (TBARS) and FOX2 assay methods, and GC-MS analysis. Our findings indicate significant ($p<0.05$) increase in saponification values, peroxide values, percentage free fatty acid values, acid values, aldehyde groups, lipid hydroperoxide concentrations, and significant ($p<0.05$) decrease in iodine values when compared with fresh refined vegetable oil. Our result from GC-MS analysis of methylated oil shows the presence of Cholest-5-en-3-ol (3β)- a known inducer of echinocytic transformation of human erythrocytes and further causes decrease in osmotic fragility of red blood, but fails to capture very short chain hydrocarbons which necessitates the

derivitazation method that was able to detected already established cytotoxic product namely; trans, trans-2,4-decadienal, a highly reactive α,β-unsaturated aldehyde capable of inducing oxidative/nitrative stress and apoptosis.

Keywords: Lipid Peroxidation Products, Re-used deep fried vegetable oil, Cholest-5en-3ol, trans, trans-2,4-decadienal and cytotoxic

NSBMB/UPH/EP/034

Hypoglycemic and Anti-Inflammatory Activities of Ethanol and Hexane Extracts of *Corchorus olitorius* (Jute) Seeds

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ABSTRACT

Corchorus olitorius has both culinary and medicinal applications. The current study was designed to evaluate the hypoglycemic and anti-inflammatory activities of ethanol and hexane seed extracts of *Corchorus olitorius* in other to ascertain its therapeutic potentials. The *in vitro* anti-inflammatory and the *in vivo* hypoglycemic activities of the extracts were determined using Bovine Serum Albumin (BSA) Assay and oral glucose tolerance test (OGTT) on albino rats respectively. Qualitative phytochemical screening was performed and it shows the presence of phenols, tannins, alkaloids, flavonoids, saponins and terpenoids in ethanol extracts while the presence of only alkaloids, flavonoids and terpenoids was observed in hexane extract. In Oral Glucose Tolerance Test, the effect of the extract was compared with metformin (1.03mg/ml) and a normal saline treatment group. The extract significantly ($p \leq 0.05$) reduced blood sugar levels in normoglycemic, and OGTT groups. Bovine Serum Albumin test was concentration dependent where ethanol extracts exhibited a higher IC50 value (1.5µg/mL) compared to aspirin (0.7 µg/mL) than hexane extracts which has shown a lower IC50 value (0.47 µg/mL) compared to aspirin (0.68 µg/mL) all with BSA.

Keywords: Medicinal plants; Corchorus olitorius; Jute, Hypoglycemic, Anti-inflammatory

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Ameliorative Property of *Melastomastrum capitatum* Leaf Extract in Wistar Rats Exposed to Phenylhydrazine-Induced Oxidative Stress

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ABSTRACT

Anaemia is defined as a condition in which there is a decrease in the ability of the red cells to carry oxygen. *Melastomastrum capitatum* (Melastomataceae) is a wild plant commonly found in the South-South zone of Nigeria. It is locally called 'Eyop inuen' in Akwa-Ibom and 'Andekerea' in Bayelsa States of Nigeria, where it is believed that the leaf can prevent illness in children during weaning. This study aimed to evaluate the effect of methanol extract of *Melastomastrum capitatum* leaves on antioxidant parameters in rats exposed to phenylhydrazine-induced oxidative stress. Methanol extract from the leaf was prepared and an anaemic state was induced in sets of male Wistar rats (120-150g) using phenylhydrazine (PHZ; 60mg/kg) intraperitoneally, once daily, for two consecutive days. The normal control rats received the vehicle. Treatment of the anaemic rats was done by either administering doses of the extract (100 and 250 mg/kg) or vitamin C (reference drug) for another 14 days. Results revealed marked improvement in the levels of PCV, HGB, and RBC after treating the anaemic rats with the extract or vitamin C. The extract significantly ($p<0.005$) reduced lipid peroxidation, and increased GSH levels after treatment in a dose-dependent manner in all the tissues. SOD and CAT activities were significantly improved in the tissues, while no significant change was recorded in glutathione peroxidase activity after treatment. Thus, *M. capitatum* leaf extract significantly scavenged the reactive oxygen species produced due to phenylhydrazine metabolism and invariably reversed the anaemic state of the animals close to normal.

Keywords: Anaemia, *Melastomastrum capitatum*, phenylhydrazine, antioxidants, haematology

NSBMB/UPH/EP/036

Effect of Aqueous Ethanol Leaf Extract of *Anacardium Occidentale* on Liver And Kidney Parameters of Wista Rats

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ABSTRACT

Anacardium occidentale leaf is used for therapeutic purposes in Nigeria and other parts of the world. This study aimed at determining the percentage yield, and phytochemical content of the aqueous ethanol extract. The toxic effect of the extract was determined in acute toxicity (LD_{50}), percentage body weight gain, relative organ body weight ratio, on the kidney and liver functions parameters in the albino rats administered orally for 7 and 14 days. 27 adult albino rats were used. 3 were used for acute toxicity studies (up and down procedure) at 5000mg/Kg,

while 24 were used for sub-acute toxicity, grouped into 6 animals per group. Group 1 (control), group 2, 3, and 4 were dosed with 100, 250 and 400mg/Kg of the extract respectively. The percentage yield was 44.66%, while the phytochemical analysis showed the presence of alkaloids, flavonoids, saponins, phenolic compound and Tannins, while a steroid is absent. The LD_{50} showed no mortality or sign of toxicity at the dose of 5000mg/Kg body weight in rats used. When compared with the control group, the percentage body weight gain showed decrease in weight as the days of administration increase from 7 to 14 days. The relative organ (liver) body weight ratio of all the treated rats showed non-significant ($p > 0.05$) different from the control while the relative organ (kidney) body weight ratio of groups 2 and 3 also showed non-significant ($p > 0.05$) different, but group 4 showed significant ($p < 0.05$) different. The AST, ALT, ALP, Bilirubin, Total protein and Albumin in the liver treated rats showed non-significant ($p > 0.05$) different from the control, while the kidney parameters, Creatinine and chloride also showed non-significant ($p > 0.05$) different, but Urea, sodium, and potassium showed significant ($p < 0.05$) different in groups 3 and 4 of the treated rats. The results of sub-acute study suggest that the aqueous ethanol extract of *Anacardium occidentale* leaf may not be toxic to the liver, but toxic to the kidney at 250 and 400 mg/Kg body weight after the 14 days administration.

Keywords: Phytochemicals, Acute Toxicity, Sub-Acute Toxicity, Ethnomedicine, Hepatotoxic

NSBMB/UPH/EP/037

Exploring the Antimalarial Potential of *Achyranthes aspera Linn*: The Active Phytochemicals and their Inhibitory Effects on Key Plasmodium spp Proteins

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ABSTRACT

Achyranthes aspera Linn is widely distributed in Nigeria as one of the medicinal plants used in the management of fevers traditionally. This study was designed to identify the active phytochemicals and determine their respective inhibitory effect against some *Plasmodium species'* enzymes. Plant samples were collected from Bokkos and Mangu, Plateau State; processed; and the methanolic extracts prepared. The antimalarial activities were evaluated against *Plasmodium berghei* in an animal model. The chloroform fraction which was the most active was analysed to identify the phyto compounds responsible for the activity. Molecular docking was employed to study the binding activities of the compounds to the *Plasmodium falciparum* lactate dehydrogenase enzyme (*PfLDH)* and falcipain 2. The antimalarial potential of the molecules was screened using Autodockvin42 software. Some of the phyto compounds from *A. aspera* identified were: 1-pentacontanol phosphate, betaine, gypsogenic acid, chikutsesusaponin Iva, rotundioside B, 5,7-dimethoxflavones-0-alpha-rhamnopyranosyl,

glycosyl, betulelic, α-spinasterol, Rotundiosides B and 4-(3-hydroxy-1-propenyl-2-methoxy phenol. The *In-Silico* analyses suggested that Rotundiosides B and 4-(3-hydroxy-1-propenyl-2-phenol inhibited *PfLDH* and falciparum. The docking studies heightens the claim and earlier reports that *Achyranches aspera* exhibits antimalarial activities. Thus, the inhibitory tendencies of the molecules against enzymes of *P. falciparum* opens new frontiers for scholastic discourse.

Keywords: Malaria, *Achyranches .aspera*, *Plasmodium species*, Phytochemicals

NSBMB/UPH/EP/038

Effects of Methanol Fraction of *Mangifera haden* Seeds on Carbon Tetrachloride Induced Hepatotoxicity in Albino Rats

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ABSTRACT

Liver diseases are a major worldwide health problem, particularly in developing countries. This study investigated the effects of methanol fraction of Mangifera haden seeds on carbon tetrachloride-induced liver damage in Wistar albino rats. The phytochemical compositions and acute toxicity studies of crude extract and Mangifera haden seed fraction were determined using standard methods. Sixty albino rats were randomly grouped into twelve groups of five rats each. Determination of total bilirubin and protein, lipid peroxidation, liver enzyme markers, antioxidant enzymes, glutathione, lipid profile analysis, and histological examination were carried out using standard methods. Phytochemical constituents of crude extract and methanol fraction of Mangifera haden seed showed a relative amount of flavonoids, phenolics, saponins, tannins, terpenoids, triterpenes, alkaloids, and coumarins. Liver injury was induced with carbon tetrachloride (CCl_4) at a dose of 1.0 ml/kg body weight. The administration of methanol fraction of Mangifera haden seeds significantly ($P < 0.05$) lowered the levels of serum TC, TAG, LDL, and increased HDL levels. The level of serum malondialdehyde (MDA) significantly ($P < 0.05$) increased in the CCl_4 group compared to normal and treated groups. The elevated level of serum MDA decreased ($P < 0.05$) significantly in rats treated with 200, 400, and 600 mg/kg of methanol fraction. The rats treated with CCl4 had significant ($P < 0.05$) increases in serum ALT, AST, and ALP compared to the normal group. Animals treated with varying doses of methanol fraction produced significant ($P < 0.05$) reduction of serum ALT, AST, and ALP activities when compared to the CCl_4-untreated group. The activities of hepatic antioxidant enzymes (SOD, CAT, and GPx) and glutathione concentration significantly ($P < 0.05$) decreased in the CCl4-untreated group compared to the normal group. The decreased activities of the antioxidant enzymes and glutathione concentration in CCl4 intoxicated rats were ameliorated more effectively in rats treated with 200, 400, and 600 mg/kg methanol fraction of Mangifera haden seed. Total bilirubin (TB) concentrations significantly ($P < 0.05$) increased in the CCl4-untreated group compared to the normal group. Oral treatment of rats

with varying doses (200, 400, 600 mg/kg) of methanol fraction caused a significant ($P < 0.05$) decrease in the serum TB levels. Administration of CCl4 showed a reduction in serum total proteins. Treatment of the animals with 200, 400, and 600 mg/kg of methanol fraction caused significant ($P < 0.05$) increases in serum total protein. Histological examination showed hepatoprotective properties of the plant's fractions.

Keywords: *Mangifera haden*, Carbon Tetrachloride, Malondialdehyde, Hyperlipidemia, Hepatotoxicity.

NSBMB/UPH/EP/039

Jimson Weed Prevented Methotrexate-Induced Neurotoxicity Via anti-Oxidative, Anti-Inflammatory, Anti-Apoptotic, and Inhibition of AchE, and Caspase-3 Activities in Rats

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ABSTRACT

Methotrexate (MTX) is a drug of choice for the treatment of different types of cancers and autoimmune disorders. Despite its effectiveness, its toxicity is the major drawback of its use. We evaluated the outcome of ethanol leaf extract of Jimson weed (ELEJW) on neurotoxicity prompted by MXT use. Forty albino rats (male) were assigned into four categories (n=10): 1=Control (5 mg/kg normal saline); 2= Extract (200 mg/kg ELEJW); 3= MXT (20 mg/kg MXT); 4= Test (200 mg/kg ELEJW + 20 mg/kg MXT). MXT was given on day 18 only (ip) while ELEJW was by gavage for 21 days. MXT injection caused oxidative stress, inflammation, and increased cerebral cell death in rats as evidenced by elevation in SOD, CAT, GPx, AchE, and Caspase-3 activities and also increases in MDA, NO, IL-6, and TNF- α concentrations. Intriguingly, ELEJW administration to rats reversed this trend. The histological alterations caused by MXT were resolved as intact neuronal cells with normal glial and pyramidal cells were observed. Co-treatment of ELEJW with MXT overturned the oxidative stress, inflammation, and histological alterations perpetuated by MXT. Therefore, Jimson weed should be explored as a supportive therapy for the management of MXT-induced neurological derangements.

NSBMB/UPH/EP/040

Isolation and Characterization IgY from Egg Yolk of Chicken

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ABSTRACT

Snake envenoming is a neglected tropical disease with important public health concern, particularly in rural areas of the tropics. Unfortunately, antivenom is the only definitive and most effective treatment available for its treatment. The current method of isolation of immunoglobulin G (IgG) from horse serum used for antivenom is time consuming, has low yield and involves the use of caprylic acid and ammonium sulphate. Regrettably, Immunoglobulin Y (IgY) from egg yolk of birds, an alternative to IgG is not precipitated by neither Caprylic acid nor Ammonium Sulphate. Accordingly, this research therefore aims to develop a fast and more effective method for the isolation and purification of IgY from egg yolk. Sequential Precipitation was carried out using Polyethylene Glycol 6000 (3.5%,8.5%,12%), followed by centrifugation and dialysis. Each purification step was monitored at 280 nm and SDS-PAGE was used to determine the purity of the IgY. The reducing SDS-PAGE shows confirms the heavy and light chain at 68 and 27 KD respectively on the gel. Our findings indicate that our method is a cheap and effective means of isolating IgY from egg yolk and may be a better alternative for the production of antivenom.

Keywords: Snake envenoming, Immunoglobin Y (IgY), Neglected tropical disease, Protein purification, antivenom

NSBMB/UPH/EP/041

Hepatoprotective` Effect of *Vitex doniana* Stem Bark In Augumentin-Induced Mice

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ABSTRACT

Drug-induced liver injury is one of the most frequent sources of liver failure and the leading cause of liver transplant. Hepatoprotective activity of aqueous extract of *Vitex doniana* stem bark against Augmentin-induced hepatic damage in Swiss albino mice was observed at 100, 200 and 400 mg/kg body weight for 14 days. The healthy control, Augmentin-induced

(untreated), and Silymarin-treated (standard drug) groups were also maintained for the comparison. A total of 48 adult mice were used for both acute toxicity studies and biochemical analysis using standard procedure. The LD_{50}, phytochemicals, serum total protein, ALT, AST, ALP, GGT, LDH, albumin, globulin, bilirubin, haematology, and histology were assessed. The LD_{50} was 1318.0 mg/kg. Flavonoids, tannins, phenolics, alkaloids, saponins, steroids, glycosides, triterpenes, and reducing sugars in 255.26, 25.09, 5.48, 3.36, 0.21, 0.18, 0.11, 0.08, and 0.05 mg/100g, were detected respectively. The weight of the treated group increased while organ-body weight ratio was comparable to the treated groups. The serum protein, albumin, globulin, bilirubin, ALP, and GGT levels compared favourably with control, while AST, ALT, LDH activity were altered significantly. The white blood cells, red blood cells parameters, and platelets counts compared favourably with control. The histopathology study of liver also supports the presence of hepatoprotective activity in the extract by showing improved cyto-architecture of liver cells in the treated groups. The results of this study therefore confirms that aqueous extract of *Vitex doniana* stem bark reversed liver damage caused by the Augmentin in the hepatocytes of mice *in vivo* with mild effect.

Keywords: Augmentin, Silymarin, *Vitex doniana*, Toxicity, DILI

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Phytochemical and Gas chromatography –Mass spectrometric (GC-MS) Analyses of *Curcuma longa* (Turmeric) Flavonoid Rich Extract

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ABSTRACT

The present study was undertaken to investigate the bioactive compounds of methanol *Curcuma longa* (turmeric) flavonoid rich extract. The GC-MS and phytochemical composition were determined using standard methods. The preliminary phytochemical analysis of methanol turmeric extract showed the presence of phenols, alkaloids, steroids, saponins and flavoniods. The result showed high concentrations of flavoniods (29.03 ± 0.26), alkaloids (24.93 ± 0.31), steroids (11.31 ± 0.34), tanins (1.35 ± 0.11), and saponins (0.44 ± 0.17) g/100 g. Flavonoid rich turmeric extracts contained 42 identified compounds. Hexadecanoic acid, ethyl oleate, 9-Octadecanoic acid, nonanoic acid, tetradecanoic acid, eicosanoic acid, butyl caprylate, tetradecane, glutaric acid, fumaric acid Linoelaidic acid, and pentadecane, are the most abundant compounds. While methanol turmeric extract contained 48 identified compounds with multiple occurrence of some compounds. 2,4-decadienal,(E, E) Trichloromethane, nonanal, tetradecane, naphthalene,1,6-dimethyl, hexadecane, dichloroacetic acid, acetic acid, oleic acid, 9-Octadecanoic acid, 5-eicosene,(E), cis-vaccenic acid, and palmtoleic acid are the

most abundant compounds. The presence of these diverse bioactive constituents may be responsible for the medicinal properties of *Curcuma longa.*

Keywords: (GC-MS) Analyses. Bioactive compound. Methanol extract. Flavonoid rich extract. *Curcuma longa*

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Bio-active Composition, Antibacterial Activity and Molecular Docking Studies on *Rauvolfia vomitoria* (Afzel.) Root Extracts

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ABSTRACT

This study identifies the bioactive compounds present in the root extracts of *Rauvolfia vomitoria*, using Gas Chromatography Mass Spectrophotometry (GC-MS) analysis method. The antibacterial potentials of *R. vomitoria* were also investigated using Disc diffusion method with slight modifications to test for susceptibility of selected test bacteria to the root extracts of *R. vomitoria*. A computational analysis was conducted to analyze the potential antibacterial bioactive component, Cyclopentane, 1,1'-[3-(2-cyclopentylethyl)-1,5-pentanediyl]bis- (CID 281840), identified from GC-MS analysis, against class A beta-lactamase enzyme (PDB: 3BLM) with the aim of identifying its inhibition potentials. Molecular docking method was utilized to predict the binding affinity and energy of the antibacterial bioactive component, CID 281840 as ligand compound with PDB: 3BLM as protein receptor. Phytochemical screening and GC-MS analysis of root extracts of *R. vomitoria* revealed the presence of twenty eight chemical compounds, which are known to exhibit physiological activities. The results from the anti-bacterial assay showed that *R. vomitoria* root extract inhibited the growth of test bacteria with inhibitory zone diameters range of 18.21 - 19.20 mm and 20.50 - 28.50 mm for the standard antibiotic agents, evidencing its antibiotic potentials. Molecular docking simulations revealed valuable insights into the potential interactions between PDB: 3BLM and CID 281840. The binding energies reported provide a quantitative measure of the interaction strength at various positions, indicating strong and favorable interactions. However, it is essential to note that these results are based partly on computational predictions, emphasizing the importance of experimental validation to confirm the actual nature and strength of the interactions.

Keywords: Molecular docking, Cyclopentane, Class A Beta-lactamase, Ligand compound, Protein receptor, Bioactive

NSBMB/UPH/EP/044

Effect of Methanol Extract of *Garcinia Kola* Stem Bark on Psa Level, Antioxidant and Lipid Profile Parameters in Dihydrotestosterone-Estradiol Valerate Induced Benign Prostate Hyperplasia in Rats

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ABSTRACT

Benign Prostate Hyperplasia (BPH) is a non-cancerous prostatic condition associated with the enlargement of the prostate gland and usually characterized with lower urinary tract symptoms. With the high prevalence of BPH and reducing cooperation of patients to drug therapy, there is great need for natural-based treatment. This research evaluated the chemotherapeutic effects of methanol stem bark extract of *Garcinia kola* (GK) on PSA levels, antioxidant and lipid profile parameters in BPH-induced rats. 25 Wistar rats weighing 120-140g placed in five groups of five rats each were used for the study. Group 1 (normal control), group 2 (drug control), group 3 (disease control), group 4 (200 mg/kg bwt of GK) and group 5 (400 mg/kg bwt of GK). The preliminary quantitative analysis of the extract showed a high concentration of phenols, tannins, flavonoids, glycosides, alkaloids, and terpenoids. BPH was induced with dihydrotestosterone-estradiol valerate. Acute toxicity studies showed the extract is safe at a maximum dose of 5000 mg/kg body weight. Results of the study showed that the PSA level and prostate size of the groups treated with the extract significantly ($p<0.05$) decreased compared with the disease control. There was a significant ($p<0.05$) increase in the levels of GSH, GPx, CAT and SOD, and decrease in MDA for groups treated with extract when compared to disease control. Lipid profile analysis showed significant ($p<0.05$) increase in HDL-c, decrease in TAG and total cholesterol. The reduced PSA level, prostate weight and enhanced antioxidant variables suggest that GK can be used to manage BPH.

Keywords: BPH, PSA, *Garcinia kola*, Antioxidants, Lipid Profile, Histopathlogy

NSBMB/UPH/EP/045

Gc-Ms Analysis of Ethanol Leaf Extract of *Hibiscus Tiliaceus* Harvested From Akpabuyo, Cross River State, Nigeria

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ABSTRACT

Background Information: Ethno pharmacology has proven that medicinal plants are used as sources of food and medicine. *Hibiscus tiliaceus* is a specie of flowering tree in the family, Malvaceae, a highly variable genus, with relatively few characteristics in common. The various species of genus Hibiscus have been used as traditional medicine all over the world. Common names include sea hibiscus, beach hibiscus, coastal hibiscus, coastal cottonwood, native hibiscus, native rosella etc.

Aim of study: Numerous reports exist of the traditional medicinal uses of this plant in various Asian and Western countries, however information on the characterization of the phyto-constituents of ethanol leaf extract of *Hibiscus tilaceus* grown in Akpabuyo, Cross River State, Nigeria is scanty hence the need for this study.

Materials and methods: *H. tilaceus* leaves were collected from the botanical farm at Arthur Jarvis University, Akpabuyo, Cross River State, Nigeria, identified and authenticated by a plant taxonomist. Dried leaves were pulverized using electric blenders into coarse particles, weighed (500g) and macerated in 4.11 litres of 70% ethanol for 72 hours after which it was filtered and concentrated using a rotary evaporator at 40^{o}C. The extracts yield (10%) (5g) was preserved in a desiccator and later used for GCMS analysis

Results and conclusion: results revealed about 29 compounds which included 4-Methyl-2, 5-dimethoxybenzaldehyde, (+)-1-Cyano-d-camphidine, Ethyl .alpha.-d-glucopyranoside, phytol etc. with already reported pharmacological activities. In conclusion, the relative abundance of compounds with great pharmacological importance in this plant are the basis of its reported medicinal value. The local availability of this plant suggests that the potentials of this plant can be fully harnessed in complementary healthcare services within it environ and beyond.

Key words: GC-MS, *Hibiscus tiliaceus,* crude ethanol leaf extract

NSBMB/UPH/EP/046

Evaluation of the Anti-virulent Potentials of Ginger (*Zingiber officinale* L) and Garlic (*Allium sativum*) on *S. aureus* and *P. aeruginosa*

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ABSTRACT

The degree of a pathogen causes infection is termed virulence. Anti-virulence substances could inhibit the expression of virulence by these pathogens thereby limiting the degree of diseases caused. The study aimed to evaluate the anti-virulence of *Zingiber officinale* and *Allium*

sativum on S. aureus and P. aeruginosa. The Methicillin-resistant *Staphylococcus aureus* and Carbapenem-resistant *Pseudomonas aeruginosa* associated with clinical specimens were collected from the Microbiology Research Laboratory, Department of Microbiology, Rivers State University. The extracts of *Zingiber officinale* and *Allium sativum* were prepared using the standard method. The virulence considered included lecithinase, biofilm formation, coagulase, swarming, haemolysis and pyocyanin. Thus, the inhibition of this virulence and curring the isolates was carried out using the standard method. Results showed that the ginger extract inhibited 30, 10, 20 and 20% of the S. aureus isolates from producing haemolysis, biofilm, coagulase and lecithinase, respectively. While 10%, 20%, 10% and 30% of the isolates were inhibited after treatment with garlic extract. For *P. aeruginosa*, 20%, 30%, 40%, 20% and 40% were inhibited by ginger extract from producing haemolysin, biofilm, lecithinase, pyocyanin and swarming, respectively. The susceptibility tests after curring with the extracts and acridine orange showed that both *S. aureus* and *P. aeruginosa* were susceptible to some of the antibiotics they resisted before. The spices having shown anti-virulence properties against these pathogens, they could be evaluated for better options in the fight against bacterial pathogens and antimicrobial resistance.

Keywords: *Anti-virulence, Zingiber officinale, Allium sativum, S. aureus, P. aeruginosa*

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Chemo-Profiling and Antimicrobial Activities of Essential Oils from the Leaves of Lemongrass and Eucalyptus

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ABSTRACT

The increasing prevalence of antimicrobial-resistant pathogens and the emergence of new infectious diseases underscore the urgent need for novel and potent antimicrobial agents. Plants, renowned for their rich and varied array of biologically active compounds, present a promising avenue for exploration. In this study, we sought to identify the chemical compositions and assess the antimicrobial properties of essential oils derived from Lemongrass and Eucalyptus leaves cultivated in Nigeria. These oils were extracted via hydro-distillation of the leaves and subjected to Gas Chromatography and Mass Spectrometer (GCMS) analysis for identification of the bioactive constituents. Their antimicrobial activities were evaluated

against select bacterial pathogens (both gram-negative and gram-positive) while Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) were determined by the microdilution method. The results revealed the presence of 12 bioactive compounds in Lemongrass essential oil and 10 compounds in Eucalyptus essential oil. Notably, four compounds—alpha-pinene, beta myrcene, eucalyptol, and gamma-terpinene—were common to both oils. Major constituents of Lemongrass oil included 2,6-Octadienal, 3,7-dimethyl-, (Z-) (32.17%), beta myrcene (19.18%), 2,6-Octadienal, 3,7-dimethyl-, (E-) (18.31%), and eucalyptol (12.54%), whereas Eucalyptus oil predominantly featured eucalyptol (55.96%), gamma-terpinene (15.30%), and alpha-pinene (11.44%). The essential oils from both plants exhibited notable antimicrobial activities. The findings from this study suggest that bioactive compounds found in essential oils from Lemongrass and Eucalyptus exhibited antimicrobial activities and may have useful applications in development of anti-bacterial products.

Keywords: Essential oil, antimicrobial, GCMS, bioactive compounds, pathogens

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Comparative Study of Secondary Metabolites Present in Ethanolic and Aqueous Extracts of *Ocimum gratissimum*

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ABSTRACT

Plants have been recognized as sources of naturally occurring compounds currently being explored for use in various fields of life and different solvents are being used to extract these compounds from plants. The phytochemical analysis of ethanolic and aqueous extracts of *Ocimum gratissimum* (Scent leaf plant) was carried out using high performance liquid chromatography (HPLC) in this study in order to compare the secondary metabolites present in both extracts. Two hundred grams (200g) of fresh finely grinded *O. gratissimum* (OG) plant was submerged in 125ml of absolute ethanol and distilled water to produce OG ethanol extract (OGEE) and OG aqueous extract (OGAE) respectively. The cold extraction method was employed and the compounds were extracted by hydro distillation using a rotary evaporator. The samples were sent to the laboratory for phytochemical analyses using high performance liquid chromatography mass spectrometry (HPLC-MS). Results from HPLC-MS analyses showed the following secondary metabolites present in the two extracts in varying concentrations; Total Alkaloids (g/100g) - 9.588 and 11.583; Total Glycosides (g/100g) - 2.983 and 4.448; Total Flavanoids (g/100g) - 46.85 and 44.503; Total Phenolics (g/100g) - 276.776 and 287.349; Total Amino acids (%) - 3.660 and 6.076; Total Organic acids (%) - 0.721 and 0.730; Total Fatty acids (%), 27.329 and 28.450 for OGEE and OGAE respectively. This result

showed that both solvents can extract good amount of phytochemicals, however the secondary metabolites content of the aqueous extract was more than those of the ethanol extract of *Ocimum gratissimum*.

Keywords: Secondary metabolites; Ethanolic extracts; Aqueous extracts *Ocimum gratissimum*

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Exploring the Antivenom Potential: Characterization and Inhibition of *Naja nigricolis* Snake Venom Hyaluronidase With *Momordica balsamina* Leaf Extract

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ABSTRACT

The use of enzyme kinetics in enzymology is essential as it is vital in elucidating the function and activity of an enzyme. Thus, in this paper, this technique is used to study the snake venom hyaluronidase and its interaction with *Momordica balsamina*, a potential inhibitor. In order to achieve that, the IC_{50} of *M. balsamina* was determined, and the enzyme concentration for optimal specific activity was ascertained, subsequently, the specific activity of the enzyme in the presence of the inhibitor was determined, K_m and V_{max} values were also calculated in order to determine the type of inhibition. The IC_{50} of *M. balsamina* was found to be 18.75µM, and it was found to inhibit the activity of the hyaluronidase enzyme in a non-competitive fashion with an unchanged K_m and a varying V_{max}. This makes *M. balsamina* a viable adjuvant in the treatment of snake envenomation especially in rural areas were anti-venoms are not readily available/accessible as it reduces the likelihood of a resistance.

Keywords: Hyaluronidase, *Mormordica balsamina*, Enzyme kinetics, Enzyme inhibition

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Characterization of *Artocarpus heterophyllus* (Jackfruit) Pulp Oil and Classification of Flavonoids

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ABSTRACT

This study was carried out to characterize jackfruits (*Artocarpus heterophyllus*) pulp oil extract, to identify and classify it's flavonoids. The characterization of the pulp oil was conducted using the Association of Official Analytical Chemists (AOAC) official method of analysis. The values obtained from the characterization of the oil were; specific gravity 0.64+/-0.09, density 0.56+/-0.08g/ml, smoke point 60.02+/-0.03°C, flash point 80.01+/-0.01°C, fire point 99.96+/-0.08°C, acid value 49.37+/-3.17 mg NaOH/g, Iodine value 2.30+/-1.27 mgl2/g, peroxide value 6.05+/-0.92, Meq/kg, saponification value 437.58+/-174.54 mgKOH/g. The following flavonoids were seen in the pulp; epicatechin, kaempferol, naringenin. The pulp oil was extracted from ground pulp using a soxhlet extractor. The values obtained indicate that the oil sample is highly saturated and therefore not susceptible to oxidation.
Keywords: Characterization, Jackfruits, Flavonoids, Saponification value, Oil

NSBMB/UPH/EP/051

Haematological Evaluation and Antiplasmodial Activity of Fractions and Ethanolic Extract of *G. latifolium* in *Plasmodium berghei* Infected Albino Mice

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ABSTRACT

Gongronema latifolium (GL) is used in Nigeria as multipurpose medicinal plant possessing abundant medicinal potential with ameliorative, curative and preventive effect in diseases control and therapy. This study is set to investigate the antiplasmodial activity; suppressive, prophylactic and curative effect of GL leaves extract and fractions namely n-HEX (n-hexane fraction), ETOAC (Ethyl acetate fraction), AQF (Aqueous fraction), ACET (Acetone fraction), ETOH (Ethanol extract) on haematological parameters of *P. berghei* infected mice. Mice (157) were grouped into 3 assemblages for prophylactic, suppressive and curative antiplasmodial study. They were divided into 7 groups for prophylactic and suppressive treatments and 8 groups for the curative treatment. The groups were named as follows: MC (Malaria control), ACT (Positive control), NC (Normal control) and fractions namely ETOH (Ethanol fraction)

n-HEX (n-Hexane fraction), ACET (Acetone fraction), ETOAC (Ethyl acetate fraction), and Aqueous fraction (AQF). All the treatment batches obtained 500mg/kg body weight (bw) of the respective extract or fractions. MC got coartem (10mg/kg/day bw) and NC for curative treatment orally administered distilled H_2O (10 ml/kg bw). Treatment with *GL* in their different vehicles started after the parasites were induced, which involved another 4 days. This is the curative model. The suppressive aspect involved the administration of the different vehicles of the GL thirty minutes after which induction had taken place. This process went on for four days. The various GL vehicle forms were given to the mice for consecutively three days before induction with malarial parasites. Later, Mean Survival Time (MST) and density of blood parasite were determined for prophylactic, curative and suppressive groups, considering curative group animals for haematological analysis. The results showed that the ethanol extract and its fractions significantly ($P<0.05$) reduced the parasitaemia level in all the three models. The degree of anti-plasmodial activity was highest in prophylactic group while ACET group showed the highest chemo-suppressive potency of 93.48% among the other treatment groups. In the suppressive model, ethyl acetate fraction exerted highest chemo-suppressive effect of 80.09%. The findings further revealed that haematological indices were altered by high parasitaemia level which also significantly ($P<0.05$) reduced compared to MC. The active ingredients in the ethyl acetate fraction proved to be most effective in boosting the erythropoietic status of the experimental mice**.**

Keywords: *Gongronema latifolium*, *Plasmodium berghei*, Haematological, Ethanol fractions, Antiplasmodial

NSBMB/UPH/EP/052

Organoprotective Effects of Ethanol Extract of *Peperomia Pellucida* Leaf on Benzo (A) Pyrene-Induced Toxicity in Male Wistar Rats

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ABSTRACT

Benzo [a] pyrene (B[a]P) is an environmental pollutant which causes various organ toxicities. This study investigated the organoprotective effect of ethanol leaf extract of *Peperomia pellucida* (PPEl) on B[a]P- induced toxicity using animal model. Thirty-five (35) adult male rats weighing 150–200g were randomly divided into five (5) treatment groups (n=7). Group 1 (Normal Control) was administered with water and rat chow, Group 2 received olive oil, Group 3 received 2mg/kg b.w of B[a]P dissolved in 1 ml/kg b.w. of olive oil. Group 4 (Curative group) received 2mg/kg B[a]P from weeks 1-3 before the administration of 500 mg/kg PPEl from weeks 4-6. Group 5 (Prophylactic group) received 500mg/kg b.w of PPEl on alternate days from week 1-3 before the administration of 2ml /kg b.w. B[a]P for another 3 weeks. The rats were sacrificed after weeks four and six. Blood samples were collected for biochemical and

haematological analysis using standard methods. B[a]P administration elicited significant ($p<0.05$) increase in the liver enzyme (ALP, ALT, AST) activities and significant reduction in protein and albumin respectively, when compared with group 1 and PPEl treatment groups. The levels of creatinine, urea, potassium and sodium increased significantly in the B[a]P-induced group, compared to group 1 and the PPE1-treated groups. Administration of the plant extract led to a significant ($p<0.05$) increases in Red Blood Cells, Haemoglobin and White Blood Cells. Data obtained from this study suggest that PPEl ameliorated the toxic effect of Benzo[a]pyrene in wistar rats and thus exhibit promising organoprotective potentials.

Keywords: Organoprotective, Benzo [a] pyrene, toxicity, Leaf extract, *Peperomia pellucida*

NSBMB/UPH/EP/053

Neuroprotective Effect of Native Pear Seed (*Dacroydes Edulis*) on Aluminium-Induced Neurotoxicity in Male Wistar Rat

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ABSTRACT

Aluminium (Al) is a neurotoxic metal that can contribute to the progression of several neurodegenerative diseases. The neuroprotective efficacy of native pear seed (*Dacroydes edulis*) extract against aluminium-induced neurotoxicity was evaluated in a male Wistar rat model. The study employed a controlled laboratory design, wherein thirty rats weighing between 56 and 117 g were randomly assigned to six experimental groups with one group serving as a control and the others receiving varying concentrations of aluminium chloride ($AlCl_3$) and/or pear seed extract for duration of 60 days. Subsequently, the rats were euthanized, and their cerebral tissues were harvested for analysis of neurotoxicity biomarkers and antioxidant defences. The results demonstrated a significant attenuation of aluminium-induced neurotoxicity in the pear seed extract-treated groups, as evidenced by decreased acetylcholinesterase activity, reduced oxidative stress, and enhanced antioxidant enzyme activity. Histopathological examination revealed preserved cerebral tissue architecture and neuronal regeneration in the hippocampus, suggesting a potential neuroprotective effect. This

study provides evidence for the neurotoxic consequences of high-dose aluminium exposure and highlights the potential therapeutic utility of native pear seed extract in mitigating neurodegenerative processes. The findings suggest that pear seed extract may be a valuable adjunct in the prevention and treatment of neurodegenerative diseases, warranting further investigation in translational models.

Keywords: Aluminium-induced neurotoxicity, Brain, Oxidative stress, Pear seed extract, Neuroprotection.

NSBMB/UPH/EP/054

In Vivo Anti-Inflammatory and Anti-Nociceptive Activity of *Artocarpus altilis* (Breadfruit) Fruit Pulp Protein Hydrolysates

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ABSTRACT

Due to the side-effects and low potency of many opioids and non-steroidal anti-inflammatory drugs, bioactive peptides and proteins present in plants have gradually been recognized as a potential replacement. This study is aimed at evaluating the *in vivo* anti-inflammatory and anti-nociceptive activities of *Artocarpus altilis* protein hydrolysates. Protein isolate was obtained from *Artocarpus altilis* by alkaline solubilization and acid precipitation, and further hydrolysed using two enzymes (pepsin and trypsin) separately. Hydrolysis was performed at different enzyme: substrate ratio (1:8, 1:16, 1:32). *In vivo* anti-inflammatory activity was examined using carrageenan-induced paw edema and its mechanism of action was elucidated using carrageenan-induced air pouch model. *In vivo* anti-nociceptive activity was determined using the hot plate test and formalin induced paw flinching in wistar rats. Results showed that *A. altilis* trypsin hydrolysate at 1:32 enzyme to substrate ratio increased the latency period of the experimental animals up to 75.27% at the highest dose (40 mg/kg) in hot plate test while it inhibited both the early phase (76.81%) and late phase (78.25%) at the highest dose in the formalin paw flinching. *A. altilis* trypsin hydrolysate at highest dose (40 mg/kg) significantly inhibited edema development in the 2nd hour of carrageenan-induced inflammation and was comparable to that of the standard diclofenac sodium. In the air pouch, *A. altilis* significantly ($p< 0.05$) suppressed typical inflammatory processes such as reduced level of protein content, inhibition of pro-inflammatory cytokines (IL-6 and TNF-α), increase in the amount of inflammatory cells infiltration and inhibition of prostaglandin E2 (PGE_2). *A. altilis* protein hydrolysate resulted in suppressed expression of COX-2 and NF-κB genes in the air pouch. The results indicated that *A. altilis* protein hydrolysates possess significant anti-nociceptive and anti-inflammatory activity and this can further lend pharmacological support to its folklore uses in the control of pain and other inflammatory conditions.

Keywords: Anti-nociceptive, Inflammatory cells, Protein hydrolysates, Diclofenac, Prostaglandin

NSBMB/UPH/EP/055

Aqueous Extract of Sweet Basil (Ocimum Basilicum) Leaf Ameliorates The Adverse Cardio-Hepato-Nephrotic Effect Of Charcoal-Smoked Fish In Fed Rats

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ABSTRACT

Roasted foods consumed due to their aesthetic appeal have negative health effects. This study investigates the effects of aqueous extract of Ocimium basilicum on liver, kidney and heart biochemical and molecular changes in Wistar rats. The study involved 30 male Wistar rats, each containing five rats, fed either washed or unwashed charcoal-smoked fish in the presence or absence of 200 mg/kg OB, and assessed for oxidative stress, inflammation, and xenobiotic phase 1 metabolism. The HPLC analysis revealed that the washed charcoal-smoked fish contained higher concentration of naphthalene (42%) and benzoic acid (18%) than the unwashed charcoal-smoked fish. The biochemical and PCR assays indicate that washed-charcoal smoked caused significant ($p<0.05$) increase in inflammation and oxidative stress but a decrease in mRNA level of pro-xenobiotic phase1 related gene than the unwashed charcoal-smoked fish. Interestingly, OB significantly ($p<0.005$) reversed these oxidative stress and inflammation. It also caused a significant ($p<0.05$) increase in SOD, catalase, and PGx activities, GSH level and a concomitant decrease in the MDA level. The extract also upregulated AhR gene expression in the liver and kidney of rats fed with charcoal-smoked fish. Histopathology studies showed that the extract protects the integrity of the tissues against the structural distortion caused by the charcoal-smoked fish. This research revealed that aqueous extract of *OB* is effective in protecting the liver, kidney and heart against the oxidative damage and inflammation caused by charcoal-smoked fish.

Keywords: charcoal-smoked fish, inflammation, oxidative stress, *Ocimium basilicum*, liver, kidney

NSBMB/UPH/EP/056

Effect of Co-Administration of *Carica papaya* and *Annona Muricata* on Liver and Haematological Indices of *Plasmodium* Berghei Infected Mice

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Background: Malaria remains a public health threat and it is often a fatal disease caused by the malaria parasite of the genus *Plasmodium*. Malaria infection continues to cause considerable morbidity and mortality in resource-poor countries. Presently, artemisinin and its derivative are potent treatments for malaria and are being widely used in combination therapies, resistant to ACT is emerging in some parts of the world. This present study aims at evaluating the antiplasmodial activities and biochemical effect of co-administration of *Carica papaya* and *Annona muricata* ethanol leaf extract in mice infected with plasmodium berghei berghei.

Methodology: Forty-two (42) matured mice with average weight of 24g were used. They were divided into six groups of seven mice each. Group I served as normal control, and groups II to VI were parasitized and monitored for three days for manifestation of parasitemia. Group II serves as negative control (parasitized but not treated). Think and thin films were prepared from blood collected through tail puncture of the parasitized animals to ascertain parasitemia and parasite count using standard method Therapeutic doses of standard antimalarial drug (ACT) were administered orally to group III for three days at 8mg/kg body weight (bw). Group IV where administered with *carica papaya* at 118.3mg/kg body weight, group V where was administered with *Annona muricata* at 69.28mg/kg body weight and group VI where administered with combination of *carica papaya* and *Annona muricata* at 118.3/69.28mg/kg body weight.

Results: The results showed that significant ($P<0.05$) increased occurred in ALT, AST and ALP in group-II and III when compared to group I and also group IV, V and VI showed significant decrease when compared to group II and III. Red blood cell count, haemoglobin and haematocrit level were reduced in groups II, III, IV, and V when compared to group I, also there was a significant increase in group VI when compared to other groups except for group I which shows no significant. There was a significant increase level of White blood cell in group II and III when compared to group I also there was a significant decrease in groups IV, V and VI when compared with groups II and III. There was a significant decrease level of platelets in groups II and III when compared with ground I while groups IV, V and VI increased significantly when compared to group II and III.

Conclusion: *Carica papaya* and *Annona muricata* constitute an excellent poly herbal medicine against malaria parasite and appear not to be deleterious to tissues as well as organ. Also coartem, a brand of ACT which possessed antimalarial properties seems to cause tissues derangement. Hence, caution in it usage.

Keywords: Malaria, *Carica papaya*, *Annona muricata*, Liver parameters, Haematological indices

NSBMB/UPH/EP/057

Protective Potential of the Combination of Cucumber (Cucumis sativus) and Cabbage (Brassica oleracea) on Ethanol-Induced Ulcer in Male Wistar Rats

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ABSTRACT

Peptic ulcer is an ulcerative disorder characterized by abdominal pains which often lead to gastrointestinal bleeding and/or perforation with a high mortality risk. This study aimed to provide scientific validation for the folkloric use of vegetables (cucumber and cabbage) in Nigerian ethno-medicine for the treatment of peptic ulcer. Cucumber and cabbage were used to formulate juice extract (JE) consisting of 80% cabbage and 20% cucumber. Thirty-five rats were randomly divided into 7 groups: Group 1 (naïve control) and group 2 (negative control) received distilled water, groups 3 – 7 were pre-treated with cimetidine (50 mg/kg b.wt), rabeprazole (20 mg/kg b.wt), 1.0 mL, 1.5 mL and 2.0 mL of JE, respectively, for 14 days after which the animals were fasted overnight and induced with gastric ulcer using 1 mL of absolute ethanol on day 15. Percentage inhibition of ulceration, gastric volume, total acidity, malondialdehyde, TNF– α and interleukin – 6 levels, H+ /K+ -ATPase, SOD and CAT activities were determined. Data were analyzed using one-way ANOVA at $p < 0.05$. 2 The 2.0 mL of JE had the highest percentage of ulcer inhibition (94.7%) when compared to cimetidine (52.6%) and rabeprazole (73.7%). Groups 3-7 significantly ($p < 0.05$) reduced gastric volume, total acidity, malondialdehyde, TNF– α, interleukin – 6 and H+ /K+ -ATPase activity/level, as well as significantly ($p < 0.05$) increased SOD and CAT activities when compared to the negative control. The 2.0 mL of JE exhibited the highest gastro-protective effect. Further studies to identify the main gastro-protective compound(s) is recommended.

Keywords: Anti-inflammatory, Antioxidants, B. oleracea, C. sativus, Gastro-protective, Peptic ulcer

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Antibacterial Property of Gorontula(Azanza Garckeana) Pulp Extract on Some Selected Bacteria

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ABSTRACT

The antibacterial activity of Goron tula (Azanza garckeana) Pulp extract onsomeselected bacteria including Staphylococcus aureus, Escherichia coli andKlebsiellaspecies using agar well diffusion technique was carried out. The findings revealedthat the pulp extract had inhibitory effects on all the organisms under study. Inhibition zones of 20 mm, 18 mm and 14 mm were observed for Staphylococcusaureus, E. coli and Klebsiella specie respectively. Also, the commercially availabledrug (ciprofloxacin) used as a positive control had more antibacterial propertywhencompared to the pulp extract, with inhibition zones of 24 mm, 22 mmand 20mmforStaphylococcus aureus, E. coli and Klebsiella specie respectively. However,

therewas no statistical difference (P>0.05) in the antibacterial property betweenthepulpextract and the commercial drug. Hence, antibacterial agents could be formulatedfrom goron tula that can be used in the treatment of some ailments that arecausedby the afore mentioned bacteria.

Keywords: Agar well diffusion, antibacterial property, bacteria, goron tula, pulpextract.

SUB-THEME 7
BIOTECHNOLOGY

NSBMB/UPH/BT/001

In-Vitro Antioxidant Potential and Anti-Lipase Evaluation of *Tetrapleura tetraptera* Fruit Extract Using Kinetics Model and Molecular Docking Analysis

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ABSTRACT

Obesity is a metabolic disease that is characterized by excessive fat deposition in the adipose tissues resulting from imbalance in energy metabolism and can be managed by controlling the activity of pancreatic lipase (PL). The present study investigated the in vitro antioxidant and anti-obesity potentials of *Tetrapleura tetraptera* aqueous fruit extract (TTALE) using lipase inhibition kinetics model, SwissADME prediction tool and molecular docking analysis. Preliminary evaluation of bioactive constituents and Gas chromatography-mass spectrometry (GC–MS) revealed presence of compounds such as N'-Hydroxy-3,4-dimethoxybenzene-1-carboximidamide, 5-Benzofuranacetic acid, acetamide, 4-Nitrophenanthrene, 6,7-Dimethoxy-2H-1,3-benzodioxole-5-carbonitrile and 2-Acethydrazido-5-methyl nitrobenzene. The plant extract was also found to possess moderate antioxidant capacity and inhibited pancreatic lipase via a mixed inhibition pattern as suggested by the values the inhibition constants. Molecular docking of the GC–MS identified compounds with horse PL revealed that compounds (**CPs**) **3, 5, 6, 7, 13** and **14** have high PL-binding affinity and similar binding pose with the substrate (nitrophenylbutyrate) while that of **CP-12** was similar to the standard antilipase drug used. Hydrogen bonds and van der Waals forces were predominantly involved in the ligands' interactions with some key catalytic site amino acid residues (ILE-78, ASP-79, SER-110, TRP-252, GLN-253). Also, the SwissADME prediction tool suggested high drug-likeness, bioavailability e.t.c of several compounds of the extract. In all, this study showed that the TTALE is a rich natural source of antioxidant and anti-lipase agents which could be optimized for development of new drugs against obesity.

NSBMB/UPH/BT/002

Development of BiFC Transgenic Flies and Molecular Visualisation of 80S Ribosome

ABSTRACT

The contentious issue of nuclear translation in eukaryotes has been debated between scientists for close to 6 decades. There exist a plethora of evidences that reports translation can also occur in the nucleus, but the general view is that translation is restricted to only the cytoplasm. To

further address this issue, we adopted Ribo-BiFC technique which allows the visualisation of 80S assembly inside living cells. Here we developed Venus based transgenic flies expressing BiFC tagged fusion proteins. The Venus transgenic flies develops BiFC signal only when crossed with gal-4 transgenic flies. These transgenic flies allows us to visualise 80S ribosomes and presumably translation sites in the salivary glands of *Drosophila melanogaster* third instar larvae. The results obtained suggest that ribosomes are present within the nucleus and especially in the nucleolus of all salivary glands in *Drosophila* larvae that were visualised. The outcome of this investigation supports the many other previous findings that nuclear translation may occur in eukaryotic organisms.

Keywords: Venus-transgenic flies, Translation, Nucleus

NSBMB/UPH/BT/003

Production of Methionine and Valine Using *Bacillus* Species Isolated From Soil for Industrial Application

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ABSTRACT

Amino acids production such as methionine and valine by fermentation has become an essential technology of industrial microbiology. Fermentation processes have become a common practice for amino acids production. Nowadays, it is the most cheaper and easier process for commercial production of methionine, valine and other essential amino acids. Valine has an extensive industrial application, which is used as intermediate for the synthesis of agricultural pesticides and semi-synthetic veterinary antibiotics. Methionine is a sulfur-containing essential amino acid required in the diet of humans and other animals for normal growth and functions of the body. It is widely used in feed, pharmaceutical and food industries. This research work was focused on fermentative production of methionine and valine using different *Bacillus* spp. isolated from soil. The results of this study identified four different bacterial isolates (*Bacillus* spp.), identified morphologically and biochemically. The results for the characterization of methionine and valine produced using *Bacillus* spp. shows similar properties with the commercially produced methionine and valine using Fourier transform infrared spectroscopy (FTIR) which identified the amino group and carbonyl group spectrum, thin layer chromatography (TLC) showed bands of the methionine and valine produced by *bacillus* spp. aligned with the standard/commercial product which was further confirmed by amino acid analysis using Phenylthiohydantoin (PTH) amino acid analyzer. Based on the study, *Bacillus subtilis, Bacillus badius, Bacillus anthracis* and *Bacillus cereus* were identified as methionine and valine producing bacteria and *Bacillus* cereus has the potential for industrial production of methionine and valine.

Keywords: Fermentation, Valine, Methionine, *Bacillus* species

NSBMB/UPH/BT/004

Partial Purification, Characterization and Inhbition by Gold Nanoparticles of Bovine Soluble Catechol *O*-Methyltransferase

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ABSTRACT

Current treatments of Parkinson disease (PD) rely on administration of levadopa, a precursor of dopamine neurotransmitter, which crosses blood-brain-barrier. Catechol *O*-methyltranferase (COMT) inhibitors are administered as adjunct with levadopa to prevent its peripheral methylation. Conventional COMT inhibitors present drawbacks thereby militating their usage. In this study, bioinformatics analyses and structural modeling revealed high (>90%) similarity between human and bovine soluble COMT (SCOMT). Considering the similarity, vis-à-vis the accessibility and availability, bovine SCOMT (BSCOMT) from liver tissue was partially purified to 7.78 fold, characterized and its activity optimized against gold nanopaticles (Au-NPs). Employing fluorometric COMT activity assay, using esculetin as substrate and *S*-(5'-adenosyl)-*L*-methionine (SAM) methyl donor; the temperature and pH optima of BSCOMT were 40 ˚C and 8.5 respectively. The K_m and V_{max} values of the enzyme were respectively determined as 1.401 ± 0.022 µM and 0.034 ± 0.0015 µmol min^{-1}. Consequent to addition of 3 µM Au-NPs, K_m increases to 1.468 ± 0.332 µM and V_{max} decreases 0.0374 ± 0.0022 U/µmol/min. The increase in K_m and decrease in V_{max} is suggesting mixed inhibitory effect on COMT activity by Au-NPs. This finding is suggesting a new opportunity in the control of COMT activity, and thus, management of PD through nanotechnology.

Keywords: Catechol *O*-methyltranferase, Gold nanopaticles, Parkinson disease

NSBMB/UPH/BT/005

Recombinant Production of Soluble Plasmodium Falciparum Cysteine Proteases as a Platform for Screening Inhibitors From Crude Herbal Extracts

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ABSTRACT

The emergence of resistance in the malaria-causing parasite *Plasmodium falciparum* against existing antimalarial drugs represents a significant challenge for individuals affected by malaria. However, the presence of multiple targets that are engaged by antimalarial drugs impedes the development of resistance against these drugs. Erythrocytic malaria parasites utilize proteases for several cellular processes, including hydrolysis of hemoglobin, rupture of erythrocytes by mature schizonts, and subsequent invasion of erythrocytes by free merozoites. Among potential new targets for antimalarial chemotherapy are *Plasmodium falciparum* cysteine proteases, known as falcipain. In this study, we have established a platform that enables high throughput screening and *in vitro* evaluation of falcipain inhibitors with the aim of identifying potential anti-malarial drugs. The Falcipain gene of *Plasmodium falciparum* was amplified from clinical isolate. The fusion expression Vector DNA – pTXB1, was utilized to introduce the Falcipain gene into strains of T7 Express Competent *E. coli,* for over-expression. The recombinant Falcipain protease was purified using Intein Mediated Purification with an Affinity Chitin-binding for uniform measurement of enzymatic activity and immobilized on 96-well plates for detection of Falcipain proteases targeted inhibitors. The results showed that the enzymatic activity of Falcipain sharply dropped in a concentration-dependent pattern, in the presence of Leupeptin a standard protease inhibitor. Furthermore, this enzyme assay was applied to screening inhibitory component (s) of Falcipain from the crude extracts of medicinal plants, *Cassia nigricans*, *Plukenetia conophora*, and *Azardicha indica*, in which the anti-malarial properties was previously observed. The current methodology for assessing enzymatic activity using recombinant falcipain serves as an efficient, cost-effective, and streamlined approach for identifying inhibitors of *Plasmodium falciparum* cysteine proteases (falcipain). This method enables the discovery of inhibitory compounds derived from both synthetic chemicals and crude extracts of medicinal plants, thereby aiding in the development of novel antimalarial drugs.

Keywords: *Plasmodium falciparum*, antimalarial drugs, enzymatic activity, immobilized

NSBMB/UPH/BT/006

Analysis of Polyhydroxyalkanoate PHA From Diculture of *Pseudomonas* and *Klebsiella* sp.

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ABSTRACT

Polyhydroxyalkanoates (PHA) are biopolymer molecules comprising of 600 – 35000 (*R*)-hydroxyl fatty acid monomer units. Bacteria strains of *Pseudomonas* and *Klebsiella* were isolated from petroleum contaminated soil and municipal waste water respectively. The strains were confirmed using standard microbiology and biochemical techniques; however geneomic sequencing of the 16s confirmed the isolates as *Pseudomonas aeruginosa* and *Klebsiella aerogene.* PHA compound were produced from the diculture in a submerged fermentation system with production parameters optimized. Percentage yield of the compound from the fermentation system was recorded as 70%. Spectroscopy analysis of the produced PHA compound from the dicultures of *Pseudomonas aeruginosa* and *Klebsiella aerogenes.* showed the absorption band typical of the polymer at various absorption wave-length from 800-1100 cm^{-1}. However purifying agents of sodium hypochlorite, ethanol and acetone showed variability in expression of functional groups of the compound as shown in the absorptivity of the spectrum bands. The degree of hydroxylation of the produced PHA with sodium hypochlorite, caustic soda, ethanol and acetone was seen at 75, 60. 50 and 45%, respectively. The mechanical and physical properties of PHA compounds at various treatments respectively showed variability in the mechanical and physical strength of the compounds at various modifications respectively as stated pH, viscosity (mm^2/s), tensile strength (N) and flash points (^0C) of the raw PHA at 5.0, 10.34, 6.6 and 300 however blended PHA showed values at 5.5; 13.11; 7.4 and 321 at the respective parameters. The study revealed the mechanical and physical properties of the respective treatment which are reasonably better than their fossil derived counterparts.

Keywords: PHA, bacteria strains, mechanical properties, FTIR-spectroscopy.

NSBMB/UPH/BT/007

Characterization of Phytase Produced from *Aspergillus flavus* Isolated From African Giant Snail (*Achatina fulica*) and Evaluation of its Phytic Acid Biodegradation Efficiency in Selected Agricultural Products

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ABSTRACT

Phytase an enzyme also known chemically as myo-inositol-hexaphospate hydrolase catalyzes the hydrolysis of phosphate from inositol hexaphosphate and thereby release a usuable form of inorganic phosphorus. The aim of this study was to produce and purify phytase from *Aspergillus flavus* isolated from African giant snail (*Achatina fulica*). The phytase produced from *Aspergillus flavus* was subjected to ammonium sulphate precipitation followed by ion

exchange chromatography (DEAE Sephacel) and the gel filtration (Sephacel G-200). Physicochemical and kinetic properties of the phytase including the ability of the purified enzyme to hydrolyze phytate in agro-materials were also determined. The Purified phytase showed approximately 34-fold purification with specific activity of 23.89 U/mg and 11.38 % recovery. The purified was optimum at pH 6 and 30 ^{o}C while exhibited maximum pH stability with 78% residual activity at pH 3 and 78% remaining activity at pH 5 and 11 after 3 h. Though, the purified enzyme was maximally stable at 30 ^{o}C; however, high percentage residual activity was observed at 40, 60 and 80 ^{o}C after 40 min. All the metal ions investigated exhibited varying degree of inhibiting effect on the enzymatic activity. Chemical agents such as EDTA strongly inhibited the enzymatic activity while ascorbic acid only inhibited the enzymatic activity at 5 and 10 mM; whereas other inhibiting agents did not affect the enzymatic activity. The K_m and V_{max} values were found to be 0.37 mM and 0.156 µmol/ml respectively. The purified phytase showed varying ability to hydrolyze phytate in different cereals and legumes investigated. The purified phytase from *Aspergillus flavus* showed exceptional physicochemical properties, and hence can be applied for commercial and industrial purposes.

Keywords: Phytic Acid, Phytase, Enzyme Activity, *Aspergillus flavus, Achatina fulica*

NSBMB/UPH/BT/008

The Resistant Starch Contents of Commonly Consumed Foods in Nigeria: A Review of the Impact of Processing Techniques

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ABSTRACT

Resistant Starch (RS), a type of starch that evades digestion in the small intestine, varies widely among commonly consumed foods in Nigeria. These differences are mainly based on variety, processing strategies, and types of dishes. Intake of foods high in RS is linked with decreased glycemic responses after meals. Thus, improved processing strategies to preserve and/or enhance RS content are crucial for maintaining a healthy life (Oladele, 2013). The RS concentrations of rice-based foods differ profoundly. The RS contents of basmati rice range from 39.268% to 43.427% (Nwosu, et al., 2023), whereas local rice varieties are between 1.43% and 3.13% (Odenigbo, et al., 2013). High RS concentrations are seen in plantain flours (65.648% to 82.757%) and potato starch (56.43%), while yellow sweet potato has low RS at 9.44% (Minh et al., 2022). Legumes have the least total starch content and minimal RS concentrations (3.481% to 6.788%) (Nwosu et al., 2023). Dishes prepared from cowpeas, such as moi-moi, akara, and boiled cowpea, have RS contents of 6.36%, 8.34%, and 8.55%

respectively. Similarly, RS contents of cassava dishes ('fufu', 'garri', and 'abacha') range from 5.70% to 7.07% (Ogbo and Okafor, 2015). This aligns with Hartati et al. (2020) who reported 7.32% as the highest RS value of cassava samples studied. Unlike legumes, cassava, sorghum, semovita, and bread are high in Rapidly Digestible Starch (RDS) and Glycemic Index (GI) (Otemuyiwa, Sanni, and Oyewumi, 2017). Majorly, food processing accounts for the variation in RS concentration. The average reduction in RS contents of cassava-based foods compared to the tubers is, in descending order, 70.4% in 'fufu', 52.8% in 'garri', and 35.85% in 'abacha' (Ogbo and Okafor, 2015). Methods such as steaming, cooling, freezing, drying, and frying significantly alter RS content (Marsono, 2016). The autoclaving process increases RS production from cassava starch, highlighting the impact of processing on RS levels in staple foods (Abioye, 2018). These findings underscore the importance of processing techniques in food preparation to optimize RS content for health benefits.

Keywords: Resistant Starch, Processing, Plantain, Rice, Cassava

NSBMB/UPH/BT/009

Over Expression of Salivary UBB and FN1 Genes as Potential Biomarkers for the Prognosis and Diagnosis of Coinfection in Breast and Lung Cancers

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ABSTRACT

Cancer is one of the world's most deadly diseases with high economic implications. Early detection can increase the survival chance of the patient, but at present, early diagnosis remains a challenge because of the non-specificity or absence of symptoms at the onset of the disease. The occurrence of multiple cancer types in a single individual is increasingly been reported especially among cancer survivors. This study examines the potential of salivary biomarkers in early detection of one or more of pancreatic, lung, breast and ovarian cancers. The study investigated four gene expression datasets of salivary biomarkers in pancreatic, lung, ovarian and breast cancers (GSE53325, GSE29220, GSE32175, and GSE20266 respectively) and their

differentially expressed genes (DEGs) were determined using GEO2R. The commonly DEGs among the selected cancer types were determined using Venny, the DEGs were functionally characterized under pancreatic, lung, breast and ovarian cancers in humans using the Database for Annotation, Visualization and Integrated Discovery (DAVID). The study identified 159 commonly upregulated genes in breast and lung cancers, 29,453 commonly down regulated in "Lung" and " Ovarian" cancers, 1,489 genes were commonly down regulated in breast and ovarian cancers, 16,612 genes were commonly down regulated in lung, breast and ovarian cancers while only 1 gene was found to be commonly down regulated in lung and breast cancer. The MCODE analysis revealed two clusters with one having four nodes and five edges, and the second cluster has three nodes and three edges. The study identified two key genes (UBB and FN1) that are centrally linked to others in terms of protein -protein interactions in the commonly upregulated breast and lung cancers. Therefore, the identified commonly upregulated or downregulated genes can serve as potential biomarkers related to the prognosis and diagnosis of the common occurrence of the different selected types of cancer. This study highlights the potential of UBB as salivary biomarkers for detection of co infection of breast and lung cancers.

Keywords: Biomarker, Cancer, Coinfection, Expression, Lung, Pancreatic, Salivary

NSBMB/UPH/BT/010

Studies on Purification Profile of Manganese Peroxidase from Whiterot Fungi

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ABSTRACT

Manganese peroxidase an oxido-reductase with four manganese ions in the two active sites. Strains of whiterot fungi was isolated from the bark of a decaying wood, the isolates were cultured using standard microbiology technique while biochemical test confirmed the isolates as *Pleurotus* sp. Geneomic DNA extraction and further molecular sequencing confirmed the genera as *Pleurotus djamor*. Manganese peroxidase was produced in a solid state fermentation system after successful screening of the isolate in a mineral broth media. Four steps of purification was carried out: Ammonium sulphate, dialysis, ion exchange (DEAE-cellulose) and gel filtration (sephadex G-100). Crude extract was precipitated using 60% saturation of ammonium sulphate at pH 5.0 which gave the optimum precipitation of the protein with specific activity of 323.41 U/mg. The precipitates were further desalted through dialysis for twelve hours and specific activity of 343.91 U/mg was recorded afterwards. NaCl concentration gradient of 0.2-0.4M was found suitable in eluting the bound proteins from DEAE-cellulose resin with specific activity of 434.87 U/mg recorded from the pooled

fractions. Further purification was done using sephadex G-100 and specific activity of 602.00 U/mg was recorded from the active pooled fractions. The purification table shows a 2.80 purification folds of manganese peroxidase was gotten after ion exchange (DEAE-cellulose) and gel filtration (sephadex G-100) with enzyme percentage yield of 2.00%. The specific activity of manganese peroxidase increased from 215.38 to 602.20 U/mg. Effective utilization of biocatalyst largely depends on their specific activity quotients and purification folds clarity. Pure enzymes are scarcely available due to the cost implications associated in the down-stream processing of enzymes from their crude solutions.

Keywords: Manganese peroxidase, purification, *Pleurotus djamor*, specific activity.

NSBMB/UPH/BT/011

Physicochemical Properties of *Gongronema latifolia* Plant fibre and Its Suitability for use in Biocomposite Technology

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ABSTRACT

Background: *Gongronema latifolia* is a versatile plant with culinary, medicinal, and cultural importance in Africa. Its leaves are prized for their distinctive flavor and potential health benefits, making it a valuable resource for both traditional and modern uses. Bast fibres extracted from the young stem of *Gongronema latifolia* was used in this study. **Methodology:** The method of extraction was through tank retting and the resulting fibres were uniform with almost circular cross-sections. **Result:** Phytochemical analysis of the retted fibre revealed great quantity of glycosides (> 60%) relative to the slight presence of residual tannins (0.006+0.003%), with the absence of alkaloids, flavonoids, steroids, reducing sugars, and proteins. Lipophilic and alcohol extractives obtained using Soxhlet extraction technique with n-hexane/methanol as the extracting solvents were found to be 0.91%w/w and 3.26%w/w respectively. Moisture and ash contents were found to be 0.50±0.02%w/w and 1.28±0.40%w/w respectively. The biochemical analysis of structural components on %w/w basis revealed the cellulose content to be 53.54±3.43%, hemicellulose 10.32±1.27%, acid insoluble lignin 32.10±6.52% and acid soluble lignin lignin 2.21±0.09%. The acid soluble lignin derived products- vanillic, p- coumaric and ferulic acids were found to be 0.61±0.01%, 0.92±0.01% and 0.633±0.001% respectively. Cellulose lignin ratio is 1.67. The physical and mechanical parameters include diameter 0.113mm, tensile strength 84.72 MPa, %elongation at break 2.75% and Young's modulus 1540.36 MPa. **Conclusion:** The results obtained show that

Gongronema latifolia lignocellulosic bast fibre has comparable properties with other natural and synthetic fibres used in composite technology.

***Keywords**:* Fibre, lignocellulose, phytochemicals, composite, lignin, hemicellulose

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Peroxidases A and B production were carried out from Aspergillus tamari and fumigates.

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ABSTRACT

Peroxidases A and B production were carried out from *Aspergillus tamari* and *fumigates* respectively isolated from petroleum hydrocarbon spilled soil. Physicochemical properties of the respective soil showed pH of 4.45 and 6.5 for soils from point 1 and II respectively and higher conductivity of 613 and 1013 (Ω^{-1} Cm-1), respectively when compared with the control sample. Dissolved mineral of Cl^-, SO_4, K, Ca, Mg in the respective soil samples from the petroleum spilled sites were significantly high when compared with the control experiment except for soil sample I which showed a relative low phosphate concentration of 1,23 in the presence of the control experiment, respectively. TOC and TOM contents were 87.91, 119.04; 108.13 and 146.42 mg/g for soil sample I, and III, respectively. In all the tested parameters, the experimented soils were significantly high than the control soil sample. Molecular tests (18s rDNA.) was used to identify the pure isolates of *Aspergillia* . Studies on effect of incubation period on the production of peroxidase from strains of *Aspergillus tamarrii* sp. and *Aspergillus* showed that the highest peroxidase (A and B) activity representing peroxidase from dry and wet conditions were obtained on the day 6^{th} and 5^{th} of the fermentation time figure peroxidase A activity peaked at pH 5 while that of peroxidase B peaked at pH 6.0; proteins with highest peroxidase activity was peak precipitated at 60% and 80% saturation of the salt for peroxidase A and B, respectively. The gel chromatogram showed single almost superimposed peaks of enzyme activity for peroxidase A and B respectively. Peroxidase A and B activity peaked at pH 4.5 and 5.0. optimum temperature for the enzyme activity were at 50 and 60°C respectively. Km and V max of 3.45mM and 280 µmole/min; 2.44mM and 305 µmole/min were extrapolated from the reciprocal curve of Lineweaver-burke at various concentrations of 2,6 DMP for peroxidase A. The present study have shown the kinetics of the proteins from *Aspergillus tamari* and fumigates sampled from petroleum hydrocarbon spilled soil at respective seasons. The study has exposed the impact of physiologic season variations on microbial proliferations which goes inline with the stabilizing proteins like peroxidases.

Keywords: Peroxidases, *Aspergillus*, Specificactivity, Catalysis, Physicochemical

NSBMB/UPH/BT/013

Computational Evaluation of Anti-Inflammatory Phytocompounds from *Annona muricata* Against Androgen and 5α-Reductase Receptors

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ABSTRACT

A conventional benign prostatic hyperplasia (BPH) management strategy involves reducing prostate growth using synthetic 5α-reductase inhibitors. However, the recent concern on its side effects has increased the search for safer botanical alternatives. The aim of the study was to investigate the potential of anti-inflammatory metabolites from *Annona muricata* against androgen and 5α-reductase receptors. The leaf ethanol extract of *A. muricata* was subjected to Gas Chromatography-Mass Spectrophotometer (GCMS) for compound characterization. Using *in-silico* pharmacokinetics screening and molecular docking simulations, the identified compounds were analysed against BPH protein targets: androgen and 5α-reductase receptors. The outcome was compared with a known inhibitor, finasteride, and a known androgen receptor antagonist, tamsulosin. Nine out of twenty-five identified phytocompounds passed the *in-silico* pharmacokinetics screening. Further analysis revealed three compounds including γ-sitosterol, phthalate and trapidil which demonstrated a superior affinity in binding energy for 5α-reductase at -10.8, -6.9 and -5.8 kcal/mol respectively in comparison to the least affinity capacity exhibited by myristic acid at -3.9 kcal/mol. For androgen receptor binding energy values, cyclodecanol, trapidil and γ-sitosterol showed higher affinity at -5.9, -5.3 and -4.8 kcal/mol respectively. Molecular docking simulations showed the capacities of γ–sitosterol and trapidil as potent inhibitors of both 5α-reductase and androgen receptors. Thus, this study proposes the exploration of *Annona muricata* as a viable botanical source of pharmaceutical agents in the management of BPH.

Keywords: Prostate, Anti-Inflammatory, *Annona muricata*, Pharmacokinetics

NSBMB/UPH/BT/014

Production of Bioethanol from Wild Cassava using Enzymatic Hydrolysis

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ABSTRACT

Enzymatic hydrolysis was used to hydrolyse wild cassava prior to fermentation to produce bioethanol. After enzymatic hydrolysis, the highest yield of reducing sugar of 4.984mg/L was obtained from wild cassava. Saccharomyces cerevisiae produced the highest bioethanol concentration of 646.8ml/L on the 2nd day of fermentation; this indicates the potentials of the hydrolysing organisms, and fermentative organism. Therefore, in this present study, wild cassava was affirmed as viable feedstock for the production of bioethanol.

Keywords: Bioethanol, Wild cassava, Hydrolysis, Fermentation

NSBMB/UPH/BT/015

Biofertilizer Development Using Microbiome Unique to Semi-arid and Arid Soils of the North-East: Preliminary Findings

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ABSTRACT

Agriculture is the major means of livelihood in North-East Nigeria, particularly in Borno, Adamawa, and Yobe (BAY) States. As Nigeria's population grows, the need to improve agricultural yield increases, leading to heavier reliance on agrochemicals and greater negative environmental impacts. To counter this, environmentally friendly technologies like biofertilizers are needed. Developing biofertilizers requires understanding the microbes around plant roots and their application as biofertilizers. This paper reports the collection of rhizosphere soil samples from *Ziziphus spinachristi*, *Pakia biglobosa*, *Acacia nilotica*, and *Vitellaria paradoxa* in the BAY States, analysis of soil physico-chemicals, and isolation of plant-growth promoting microbes. Standard procedures were used for soil analysis and microbial isolation protocols. Preliminary findings suggest Adamawa soil is predominantly sandy loam, while Borno and Yobe soils are sandy clay loam to clay. Rhizosphere soils of the four tree species across the three states were low in total nitrogen (0.18-0.27%) and organic carbon (0.74-1.68%). Soil pH was slightly acidic in Yobe (5.46), moderately acidic in Borno (6.28), and neutral in Adamawa (6.87). Preliminary study of rhizospheric soils from *Ziziphus*

spinachristi, *Pakia biglobosa*, and *Vitellaria paradoxa* in Borno State indicated high microbial population with CFU/mL ranging from 10.3 x 10^7 to 20.5 x 10^7. The samples showed the presence of nitrogen fixers and Azospirillum species, indicated by pellicle formation in semi-solid Norris Glucose Nitrogen-free and Malate media, respectively. Indications of Azotobacter species were found on Ashby's Manitol agar medium. These preliminary results indicate strong biofertilizer candidates from the rhizospheres of different tree species. The metagenomics part of the project is expected to reveal the microbial community structure of the rhizospheres to uncover other hidden potentials. (NEDC-MCRP Funded project)

Keywords: Biofertilizer, Agriculture, Rhizosphere, Microbiome, Nitrogen Fixers and Phosphate solubilizers.

NSBMB/UPH/BT/016

Application of Response Surface-Based Optimisation for Optimising Waste Canola Oil-degrading Parameters Under Temperate Conditions By Cold-adapted Antarctic Bacterium *Rhodococcus* sp. AQ5-07

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ABSTRACT

The Antarctica natural environment is often considered as among the most virgin areas in the world. However, the existence of pollutants from industrial areas debunked this status. At present, the Antarctic environment is no longer clean. Canola oil released into the Antarctic environment from kitchens, restaurants, slaughterhouses and food processing industries or by accidental oil spills. These deposits of lipids have led to serious anthropogenic problems such as odour problems, pipes blockage, congestion of treatment filters among others, hence killing marine organisms. The damage can be severe if the release of this waste occurs in temperate waters where biodegradation by existing marine microorganisms is limited due to the cold conditions. Plackett–Burman design was used to screen the significant parameters that affect waste canola oil (WCO) degradation rate. After the design was applied, response surface methodology (RSM) through the use of central composite design (CCD) was used to optimised the significant parameters in order to obtain the most superior degradation conditions. The optimum substrate oil concentration, nitrogen source ($(NH_4)_2SO_4$), yeast extract and pH were found to be 3.50% (v/v), 1.05 g/L, 0.28 g/L and 7.5, respectively. Second order polynomial regression model has accurately showed the interpretation of experimental data with an R^2 value of 0.9422, Adjusted R^2, Predicted R^2 and F values of 0.8882, 0.6991, and 17.47,

respectively. This study demonstrates the possible use of an Antarctic bacterium with the potential to be used in bioremediation of vegetable oil and wastewater treatments in a low temperate environment.

Keywords: Antarctica; Biodegradation; Canola oil; *Rhodococcus* sp.; wastewater

NSBMB/UPH/BT/017

The Rate Equation for Glucose Kinetics, From Cellulose Hydrolysis By *Trichodarma Reesei*

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ABSTRACT

In this research, we evaluate orange mesocarp as a feedstock for production of glucose syrup using *Trichoderma Reesei*. The material was crushed to 100 – 150μm, 200 – 250μm and 300 – 425μm particle sizes and fed into a bioreactor where delignification was carried out. A series of enzymatic hydrolysis was affected at different substrate concentrations of;0.2g/L, 0.4g/L, 0.6g/ ,L 0.8g/L, 1.0g/L, 1.2g/L, 1.4g/L, 1.6g/L, 1.8g/L, and 2.0g/L. While other reaction conditions were kept constant. Additional series of enzymatic hydrolysis was carried out at different cell concentration of 0.01g/L, 0.02g/L, 0.03/g/L, 0.04g/L, 0.05g/L, 0.06g/L, 0.07g/L, 0.08g/L, 0.09g/L, and 0.10g/L. In separate runs, the effect of substance concentration and cell loading on extent of hydrolysis was studied. Our results revealed that from 0.2g/L to 2.0g/L, there was a corresponding increase in glucose concentration from 1.2mmol/L to 2.13mmol/L and 0.4mmol/L to 2.13mmol/L as Cs = 0.6g and 1.2g respectively as time increases. Similarly there was a substantial increase in glucose concentration with increase in cell loading. Hence the reaction was found to follow a simple rate constant, **k** as 0.238 and **n** equal to 1. Hence ($\Upsilon_{p(\mathbf{glucose})} = KC^{n}_{g}$); mmol/Litre.hr.

Keyword: Rate equation, Glucose, Kinetics, *Trichodarma Reesei*

NSBMB/UPH/BT/018

Effect of Liv.52HB, *Ganoderma lucidum*, STC30, and Astaxanthin on Serum TNF-α and Liver Function Indices Following CCl_4 Induced Hepatocellular Carcinoma in Albino Wistar Rats Model

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ABSTRACT

This study examines the effect of *Ganoderma lucidum*, Astaxanthin, Liv.52 HB, STC 30, and their combination on various biochemical parameters (Serum TNF-α concentration, Liver function indices) of albino Wistar rats induced with Hepatocellular carcinoma (HCC) using CCl_4. HCC, a common type of liver cancer, develops in hepatocytes and occurs when cells avoid apoptosis due to epigenetic alterations and mutations, resulting in uncontrolled cell replication. Thirty-five albino rats of Wistar strain, weighing 60–160 g, were divided into seven groups of 5 animals each. Group I received distilled water as a placebo (normal control), Group II was induced with HCC using CCl_4 but not treated (positive control), Group III was induced with HCC and treated with Ganoderma *lucidum*, Group IV with Astaxanthin, Group V with STC 30, Group VI with Liv.52 HB, and Group VII with a combination of all four treatments. The treatment lasted for thirty-one days. Sacrifice occurred 24 hours after the last treatment dose, and blood samples were collected through cardiac puncture. The biochemical parameters estimated in the blood samples were serum Alanine transaminase, Aspartate transaminase, alkaline phosphatase, Gamma Glutamyl Transferase activities, Total bilirubin, Conjugated bilirubin, and Tumor necrosis factor (TNF) α levels. Results revealed that treatment significantly ($p<0.05$) reduced the concentrations of several biochemical parameters in the treated groups (III–VII) compared to the positive control group (II), indicating positive effects of the treatments. The parameters showing significant ($p<0.05$) reductions include AST, ALT, ALP, GGT, CB, TB, and TNF-α. These findings align with other research on natural remedies. Conclusively, the treatments effectively restored normal levels of biochemical parameters associated with HCC, indicating the potential of these remedies to restore liver physio-biochemical integrity in treated animals.

Keywords: Hepatocellular Carcinoma, TNF-α, *Ganoderma lucidum*, Astaxanthin, Liv.52 HB, STC 30.

NSBMB/UPH/BT/019

The Impact of Ethanol Extract of *Arthropteris palisotii* on Selected Biochemical Parameters of *Plasomodium berghei NK65* Infected Mice

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ABSTRACT

The leaves of *Athropteris palisotii* has been traditionally used to address prevalent health concerns in regions like Yakurr, Obubra and other parts of Cross River State, Nigeria. Given the urgent need for new antimalarial treatments due to drug resistance issues, this study evaluated some biochemical parameters of mice infected with *Plasmodium berghei* NK 65 after the administration of varying doses of ethanol extract of *Arthropteris palisotii*. The mice were grouped into six groups, six mice per group. Mice in group A were not infected with *P.berghei*, Mice in group B served as the negative control (infected with *P.berghei* and untreated). Mice in group C were infected and treated with Artesunate (5mg/kg body weight), while mice in groups D, E, and F were treated with 100, 200, and 400 mg/kg body weight of *Arthropteris palisotii* extract respectively. After treatment period, all mice were sedated with ketamine and dissected. Blood obtained by cardiac puncture. Biochemical parameters were measured using standard methods. The extract caused 14.3%, 36.3% and 69.2% suppression in parasitaemia at 100mg/kg, 200mg/kg and 400mg/kg body weight respectively while Artesunate exerted 10.1% suppression at 5mg/kg body weight. There were significant decreases ($P<0.05$) in parasite density in the groups treated with extract of *Athropteris palisotii* compared to the untreated group. The alanine transaminase (ALT), aspartate transaminase (AST), total bilirubin level was higher in negative control. A similar trend was observed in the levels of cholesterol, triglycerides, high density lipolipid (HDL) and low density lipolipid (LDL). These findings provide insight into the antiplasmodial property of *Athropteris palisotii*.

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Comparative Evaluation of Methane Yield from Continuous and Batch Fermentative Processing of Selected Agrowaste

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ABSTRACT

The efficient conversion of agrowaste into valuable resources such as methane through anaerobic digestion presents a promising avenue for sustainable energy production. This study investigated the influence of different agrowaste compositions on methane yield in batch and continuous operational modes, highlighting the significance of substrate characteristics in determining the efficiency of methane production. It comparatively assessed the methane yield derived from continuous and batch fermentative processing of the following agrowaste; Cassava peels (A), Maize husks (B), Pig Slurry (C) and Composite (D) represents the co-digestion of the aforementioned waste (A, B & C). Eight digesters were used in all, two anaerobic systems for each substrate, [ie, one operating in a batch mode (1) and the other in a

continuous mode (2)]. Cow rumen content was used to seed each digester, as a source of metanogens. Physicochemical and proximate properties of the substrates were determined, with parameters, like volatile solids, Biochemical Oxygen Demand (BOD) and gas production rates, monitored over the experimental period of 45 days. Gas analysis of the generated gas revealed mainly the following gases; Methane, CO_2, H_2S, and organic compounds like; Ethanol, Methanol, Acetic Acid, Acetone and negligible values of Acetonitrile. Minute quantities of Phenol and Lactic Acid were mainly found in the gas generated from Cassava peels. The average percentage value of Co-digested substrates (D) yielded higher gas volume of 78.263±4.54, followed by C (74.263±4.65), B (70.240±4.38) and A (56.090±3.50). The results also revealed that the continuous fermentative process demonstrated a more stable and consistent methane production rate compared to the batch system, attributed to its steady-state operational mode and continuous substrate feed input. However, modeled graphical results showed that batch fermentation system produced higher gas yield (for all the substrates) between days 29-39 before it recorded sharp decline curve, attributed to reduction in substrate availability.

NSBMB/UPH/BT/021

Application of Mitochondrial DNA in Crime Scene Investigation

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ABSTRACT

Mitochondrial DNA (mtDNA) has several applications in forensic science due to its lack of recombination, high copy number and maternal inheritance. Forensic samples analysed using mtDNA typing include old bones, teeth, hair, and other biological samples with low DNA. In this systematic review of applications of mitochondrial DNA in forensic science, research articles and materials were electronically searched in various search engines such as Pubmed, Google Scholar, and Semantic Scholar. A total of 40 papers were reviewed. The applications of mitochondrial DNA in Forensic Science were grouped under three broad categories: use in human identification (including Archaeology and evolutionary relationships), parental dispute, and linking suspects to crime scenes. The reports show that although, the use of mtDNA carries some limitations and shortcomings, it remains a reliable source of evidence especially in cases where nuclear DNA is unavailable or unsuitable to make any inference.

Keywords: mitochondrial DNA, forensic science, human identification, parental dispute, crime.

NSBMB/UPH/BT/022

Prevalence of Mycotoxin-Producing Fungi in *Bassica oleracea* Sold in Port Harcourt Metropolis, Nigeria

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ABSTRACT

This study investigated the prevalence of mycotoxin-producing fungi from *Bassica oleracea* sold in Port Harcourt metropolis, Nigeria using molecular techniques. *Bassica oleracea* showing signs of fungal infestations were collected from markets across Port Harcourt Metropolis, Nigeria. The samples were first observed for signs and symptoms. Fungi were isolated from the vegetables following standard methods. Capacity to produce mycotoxin by the fungal isolates was investigated by polymerase chain reaction (PCR)-based screening of the isolates for the presence of five mycotoxigenic genes: *nor1, tri6, otanps, fum13* and *Zea* encoding for the following mycotoxins: aflatoxin, trichothecene, Ochratoxin A, fumonisin, and zearalenone, respectively. Fourteen fungi were isolated from the vegetable, out of which four isolates were positive for mycotoxigenic genes. This represents 28.6% prevalence rate. The mycotoxigenic genes found in the isolates included Ochratoxin A, Trichothecene and Aflatoxin. Trichothecene was produced by *Pithomyces chartarum* RCBBR_Sf5 and *Fusarium longifundum* RCBBR_Mf4 while aflatoxin and ochratoxin A were produced by *Trametes duplexa* RCBBR_Mf1 and *Trametes versicolor* RCBBR_Sf2a, respectively. The ITS gene sequences of the four fungi have been deposited in GenBank under the accession numbers OR816040; OR816043-OR816045. This study has demonstrated that mycotoxin-producing fungi are prevalent in *Bassica oleracea* sold in Port Harcourt Metropolis. And this observation raises both public health and food security concerns.

Keywords: Mycotoxin; *Bassica oleracea*; Prevalence; Mycotoxigenic Genes; Polymerase Chain Reaction; ITS Gene

NSBMB/UPH/BT/024

Insilico Identification of Cyclooxygenase-2 Inhibitors Using Phytochemical Constituents of *Acalypha wilkesiana* Leaves Extract

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ABSTRACT

Inflammation is recognized as a group of complicated altering responses to tissue injury, mostly induced by toxic substances, some environmental contaminants, trauma, and infection. Some of these responses can be beneficial in wound healing and infection control, whereas others are harmful, as shown in many chronic disease states. Furthermore, untreated inflammation can either cause or foster the emergence of a variety of disorders, including cancer. Cyclooxygenase-2 is involved in the synthesis of prostaglandins that modulate pain and promote inflammation. It is expressed in response to inflammatory and other physiological stimuli as well as growth factors. At recommended anti-inflammatory dosages, all conventional nonsteroidal anti-inflammatory medications (NSAIDs) specifically inhibit both COX-1 and COX-2. The positive benefits of COX-2 inhibition include anti-inflammatory and analgesic properties; however, concomitant inhibition of COX-1 results in gastrointestinal toxicities and minor bleeding diathesis. Thus, it is necessary to create a safe anti-inflammatory medication that selectively inhibits COX-2 and has no adverse effects. The leaves of *Acalypha wilkesiana* possessed phytochemicals that demonstrated it anti-inflammatory activities. This study aimed to use the phytochemical constituents of *Acalypha Wilkesiana* leaves extract to identify inhibitors of Cyclooxygenase-2. Those extract's bioactive components were identified by GC-MS analysis, and then the compounds were subjected to physicochemical, molecular docking and pharmacokinetic analysis. Following additional screening of 38 compounds found by the GC-MS analysis, some of the compounds with the most desirable qualities were chosen and employed for docking and pharmacokinetic study. A total of 4 compounds were confirmed to have good binding affinities and energy with Cyclooxygenase-2; CID-15068 (-6.02 kcal/mol), CID-54217 (-6.01 kcal/mol), CID-19490 (-5.56 kcal/mol) and CID-22212546 (-5.30 kcal/mol) and were confirmed to poses the necessary pharmacokinetic properties. Those compounds with desirable pharmacokinetic properties were selected and considered as suitable prospective inhibitors of Cyclooxygenase-2 after successful validation.

Keywords: Insilco, Inhibitors, Phytochemicals, Cyclooxygenase-2

NSBMB/UPH/BT/025

Biophysicochemical Properties and In-Vitro Antioxidant Capacity of *Talinum triangulare* Leaves Harvested at Choba, Rivers State, Nigeria

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ABSTRACT

Talinum triangulare commonly known as waterleaf is a popular vegetable used in Nigeria, but little is known about its regional variants. By carefully examining the biophysicochemical properties, and in-vitro antioxidant capacity of *T. triangulare* leaves harvested in Choba, Rivers State, Nigeria, this study explored the special qualities of this plant. Well-established methodologies were utilized to detect and quantify key bioactive compounds such as flavonoids, phenolics, and alkaloids. Standard antioxidant assay methods for peroxidase, superoxide dismutase (SOD) and DPPH (2,2-diphenyl-1-picryhydrazyl) were employed in evaluating the plant's capacity to scavenge free radicals. The result revealed high moisture content (91.93 ± 0.59 %), with low ash and crude fiber content at 7.51 ± 0.17 % and 8.02 ± 0.09 % respectively. The phytochemical analysis indicated the presence of flavonoids, alkaloids, and phenols at concentrations of 180.07 ± 21.18 mg/100g QE, 87.54 ± 2.19 mg/100g, and 219.52 ± 7.12 mg/100g respectively. The in-vitro antioxidant activity results revealed 0.099 ± 0.021 activity/min/unit/g for peroxidase, and 0.205 ± 0.008 Units/g fresh weight for SOD. Meanwhile, the 50 percent inhibitory concentration (IC50) value of the sample against DPPH activity was 19.29 as against 0.13 recorded by the standard (ascorbic acid). This study revealed that *T. triangulare* leaves is rich in moisture and key phytochemicals and, also possess significant antioxidant capacity. In conclusion, *T. triangulare* harvested from Choba locality can be adopted as a regimen for suppressing or neutralizing free radicals.

Keywords: Antioxidant activity, Bioactive compounds, Biophysicochemical properties, Free radicals, and Waterleaf.

NSBMB/UPH/BT/026

Optimization of Ethanol and CTAB-Permeabilization of Whole Yeast (Saccharomyces cerevisiae) Cells

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ABSTRACT

Saccharomyces cerevisiae is a class of *Saccharomyces* species. It is a rich source of catalase – an enzyme of the family of peroxidase responsible for the biodegradation of hydrogen peroxide to two molecules of water and one molecule of oxygen. For faster industrial reaction of the compartmentalized catalase in the yeast cell to the external environment, permeabilization has to occur for the disruption of the cell wall and membrane. This study aimed at optimizing the

pH, temperature, concentration and incubation time of the cetyltrimethylammonium bromide (CTAB) and ethanol-permeabilized yeast cell. The cells were permeabilized with ethanol and CTAB at different concentrations, pH, temperature and incubation time. The catalase activity was assayed using UV spectrophotometric method which depends on monitoring the change of 240 nm absorbance in the presence of hydrogen peroxide. The optimal concentrations of CTAB and ethanol were found to be 0.4% and 80% respectively. The optimal pH for CTAB and ethanol were pH 8 and pH 5 respectively. The optimal temperature and incubation time was observed to be 45°C, 40mins and 35°C, 35mins for ethanol and CTAB respectively. In conclusion, the effective pH, temperature, concentrations and incubation time for CTAB and ethanol permeabilized whole yeast cell as observed can be used to optimize the use of catalase in industrial processes.

Keywords: Saccharomyces Cerevisiae, Permeabilization, CTAB, Ethanol, Optimization.

NSBMB/UPH/BT/027

Morphological, Anatomical, and Palynological Studies of *Lasianthera africana* P. Beauv (Stemonuraceae) from some Parts of Southern Nigeria

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ABSTRACT

Morphological, anatomical and palynological characters play relevant role in plant identification. This study examined *Lasianthera africana* P. Beauv (Editan Plant) based on morphological, anatomical and palynological parameters. The anatomical studies were carried out with freehand sectioning, using the stem, petiole, midrib and leaves for the characterization. The transverse sections obtained were stained with alcian blue, counter stained with Safranin, and mounted on glycerine. All slides were examined under a microscope. The result from the morphological study showed the vegetative features observed are reticulate venation, simple leaf type, entire margin, taproot system and umbrellate inflorescence. The results of the anatomical study revealed that the species is hypostomatic, the epidermal cells are irregular, with undulating anticlinal walls. The stomata types are anomocytic, and anisocytic. The midrib has bicollateral vascular bundles and the petiolar vascular bundle is arced with rib traces on both sides of the wings. Calcium oxalate and tannin occurred in the lamina, midrib, petiole and stem. The palynological studies showed pollen grains are smooth, intectate, thick exine, with tricolporate aperture, and an equatorial diameter of 21.5-25.8 µm. These features are diagnostic and confirm the placement of this species in Stemonuraceae.

Keywords: Calcium oxalate; *Lasianthera Africana*; taxonomy; pollen grain.

NSBMB/UPH/BT/028

Enhanced Cellulase Production for Improved Degradation of Maize Cob: A Mixed-Fungal Fermentation

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ABSTRACT

Cellulases are considered the most prominent of enzymes involved in the microbial breakdown of lignocellulosic waste. This study was designed to investigate the effect of various fermentation conditions on cellulase enzyme production in maize cobs from single and mixed fungal cultures as an index of good degradation and digestibility. Maize cobs were prepared and alkaline pretreated. Single and mixed-culture solid state fermentations with four degrading fungal species *Aspergillus niger, Trichoderma reesei, Lachnocladium flavidum* and *Lenzites betulina* were carried out and process parameters of incubation time, moisture content, inoculum concentration, pH, carbon source and nitrogen source were optimized from 10 groups of independent and mixed combinations of the fungi. Results indicated that *A. niger* and a co-culture of *T. reesei/ L. flavidum* were found to be most effective cellulase producers, with optimal conditions of: pH 3 - 7, moisture 70 - 75%, incubation period of 10 days, culture concentration of 5.5 x 103 spores/ ml. 1% glucose and peptone among several carbon and nitrogen supplements respectively supported optimal activities. Cellulose content was reduced by all the fermenting organisms to different degrees, however mixed culture of *T. reesei* and *A. niger* had the most significant reduction in cellulose (73.3 %). Optimal degradation of maize cob using mixed fungal cultures can be exploited for better utilization and improvement of nutritive value.

Keywords: Cellulase, Cellulose, Fermentation, Fermenting fungi, Maize cob

NSBMB/UPH/BT/029

Growth Performance and Toxicological Implications of Mixed Fungal Fermented Maize Cob Feed in Experimental Rats

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ABSTRACT

Mixed fungal fermentation was carried out to upgrade the nutritive value of the maize cobs for use as inclusion in developing a balanced feed for animal production. Grounded maize cobs were alkaline pretreated, and fermented with mixed and single lignocellulolytic fungi of *Lachnocladium flavidum* and *Aspergillus niger*. A feeding experiment assessed the growth performance and toxicological implications of graded levels (10%, 30%, and 50%) of fungal fermented maize cobs following their inclusion in the diet. Feed substituted with 10% *Lach. flavidum* was found to have the most positive effect on animal weight and the growth rate, while the feed consumption and the efficiency of feed conversion, statistical difference was not observed among the various substituted feeds. Toxicity studies reveal absolute and relative organ weights were stable Liver and kidney weight appeared normal in various fermented substituted groups. Most makers of liver function analyzed appeared normal, glucose levels however increased significantly ($P<0.05$) in most of the fermented-fed groups. Serum electrolytes as markers of kidney function also showed a stable condition while urea and creatine levels increased significantly ($P<0.05$) but within the normal range. Hematological parameters did not show compromised values as all appeared within acceptable ranges. This research has shown that 10% *Lach. flavidum A. niger* fermented maize cobs have been demonstrated to be efficacious and safe as a substitute for inclusion in animal feed production.

Keywords; Mixed Fermentation; Maize Cobs; Growth; Liver Function; Kidney Function; Hematology.

NSBMB/UPH/BT/030

Compared Alterations in Oxidative Stress Marker and Some Biochemical Parameters Between Type 2 Diabetes (T2D) and Non-Diabetic Patients in Lagos State

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Abstract: Background: Irregular free radical production brought about by the oxidation of glucose, the oxidative breakdown of glycated proteins, and nonenzymatic protein glycation promote the emergence of Type 2 diabetes.
Aims: This study compares the interaction between oxidative stress markers and lipid profiles of persons with and without type 2 diabetes mellitus (T2DM), and the impact of lifestyle changes such as dieting and physical activity, particularly in T2DM patients.
Materials and Methods: An examination of the plasma concentrations of some biochemical markers such as; protein, total cholesterol (TC), triglycerides, and high-density lipoprotein (HDL), was conducted on 35 type 2 diabetes patients and 36 healthy individuals as the control groups. The antioxidant markers: superoxide dismutase (SOD), reduced glutathione level (GSH), glutathione-S-transferase (GST); and oxidative stress indicators nitric oxide (NO) and

malondialdehyde (MDA) were also examined using a standardized spectrophotometric approach. Records of lifestyle changes involving the type of food consumed and physical activity engagement were extrapolated from their questionnaire responses.

Results: Levels of MDA in diabetics were significantly higher than those in the control group at $P < 0.001$.

Conclusion: MDA levels in type 2 diabetic patients could be a potential marker as a diagnostic and prognostic tool for the medical management of diabetes as well as accurate predictors of the likelihood of complications. The food choices and the intensity of physical exercise require further investigation to determine their impact on the oxidative stress status in diabetes patients.

Keywords: Diabetes, Type 2 Diabetes, Oxidative Stress Marker, Complications

NSBMB/UPH/BT/031

Studies on the Immobilization of β-Galactosidase on Chitosan Beads

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ABSTRACT

β-galactosidase producing *Lactobacillus* was isolated from dairy industrial waste water collected from Rumuekini, Rivers state. Biochemical test and 16 s rDNA sequencing was used to confirm the strain as *Lactobacilli acidophilus*. The organism was further standardized using Macfarland solution ($BaCl_2$/Sulphuric acid). The β-galactosidase producing ability of *Lactobacilli acidophilus* was determined using o-NPG and p-NPG as standard substrates. *Lactobacillus acidophilus* showed positive colouration on these substrates; however, the yellow colouration was much rapid with p-NPG after two days of incubation. Optimization of physiologic conditions for β-galactosidase production from *Lactobacillus acidophilus* was carried out in submerged fermentation (SMF) system. Percentage yield of chitin and chitosan from the snail shells depigmented with 0.1% hydpochlorite were 62.3 % and 58.6 % respectively. Other depigmenting agents gave less yields of chitin and chitosan. pH 6.0 gave the optimum immobilization pH to both adsorbed crude extracts and purified solution of β-galactosidase onto chitosan beads whereas immobilization period of 120 min and 60 were optima for adsorption of crude extracts and purified solution of β-galactosidase respectively. pH 6.0 and immobilization period of 2 hours were used for cross linking of β-galactosidase using EDC/NHS and glutaraldehyde cross-linkers respectively. Immobilization efficiency (IE) of both the crude and purified extracts of β-galactosidase were 69.4% and 70.09% where the IE of β-galactosidase crosslinked with EDC/NHS and glutaraldehyde were 69.18 % and 68.71 % for crude proteins respectively while IE of 76.14 % and 77.76 % were obtained for purified

β-galactosidase respectively. Optima pH of 5.0 and 5.5 was obtained for physically adsorbed and cross-linked β-galactosidase respectively whereas 70°C was obtained as the optimum temperature for both the physically adsorbed and cross-linked β-galactosidase. The results from this study have shown that *Lactobacillus acidophilus* isolated from dairy industrial waste water has the potential to be a commercial source for β-galactosidase production which has shown great propensity for immobilization on chitosan matrice produced using cheaply available chitinous material(s).

Keywords: *Lactobacillus acidophilus,* β-galactosidase, immobilization, EDC/NHS, glutaraldehyde.

NSBMB/UPH/BT/032

In-silico Multi-epitope Vaccine Candidate Design for Chicken Coccidiosis

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ABSTRACT

Coccidiosis, a pathogenic disease caused by *Eimeria*, is one of the major challenging infectious diseases that impact significant economic burdens on commercial poultry farmers. Not only does it jeopardize human nutritional and economic endeavors, its management via hygienic practices and biosecurity falls short in curbing the transmission. Drug treatments using anticoccidiosis agents are not very effective owing to resistance development which prompted exploration into prophylaxis as a more viable solution. However challenges of low immune response, side effects and cost, are undermining factors in using the developed live virulent and attenuated strains vaccine. This study adopts an immunoinformatics approach to design a potential multi-epitope vaccine for chicken coccidiosis, drawing from *Eimeria* apical membrane antigens (AMAs) and major sporozoite surface antigens (SSAs). Standard structural Bioinformatics tools were utilized to identify antigenic epitopes from these key proteins involved in the *Eimeria* pathogenesis and thereafter conjugate them into a multi-epitope subunit vaccine. Through rigorous analysis encompassing antigenicity, allergenicity, toxicity, and cytokine-inducing capacity, 26 selected epitopes from *Eimeria* surface and protective proteins of immunological significance were scrutinized. To enhance immune response, Beta defensin-3 adjuvant was incorporated, while appropriate linkers were used to conjugate the vaccine's subunits. The resulting construct was subjected to vaccine-likeness profiling of physicho-chemistry, molecular docking and immune simulation. The final product emerges as a stable and promising vaccine candidate for laboratory validation having scaled through in-silico vaccinological evaluation.

Keywords: Chicken, Coccidiosis, Eimeria, Immunoinformatics, Sporozoites, Vaccine

NSBMB/UPH/BT/033

Comparative Nutritional Characterization of Selected Drought Tolerant Nigerian Local Rice Cultivars

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ABSTRACT

In ensuring the provision of adequate and nutritious food for human needs, particularly in Nigeria, drough-tolerant rice cultivars with inherent good quality traits are important. However, drought-tolerant cultivars with little or no quality trait are short of the 'adequate and nutritious' purpose of food consumption. Vis-à-vis the extant climate change challenges, and for attainment of effective nutrition security in a climate-changed world, it is therefore, expedient to scientifically characterize and identify good quality rice cultivars with intrinsic drought tolerance potentials. In this study, four drought-tolerant rice cultivars from four rice growing states in the Northern part of Nigeria were selected and investigated for nutritional quality and transgene presence using proximate, elemental and molecular analyses. The proximate analysis results showed that '*Nassarawa-Lafia'* has the highest protein and least carbohydrate content (10.20% and 76.89%) while '*Kebbi-Jirani'* has the highest fiber content of 1.81%. Mineral analysis results of key elements; potassium, Magnesium, Calcium, Iron, Zinc revealed significant variations as some cultivars like '*Niger-Jerusalem'* and '*Nassarawa-Lafia'* were highly enriched in potassium up to 118.72mg/100g and 116.69mg/100g while *Kebbi-Jirani* and '*Jgawa-mafa'* have higher magnesium and iron contents of (31.80mg/100, 4.63mg/100g) and (24.80mg/100, 5.23mg/100g) respectively than '*Niger-Jerusalem'* and *Nassarawa-Lafia*. The molecular diagnostics showed no transgene presence in all the samples. These findings highlight the desirable nutritious qualities in the selected Nigerian local rice cultivars in their nutritional and health benefits which are within standard ranges. Hence, this calls for more in-depth searching of our expansive local genetic pool for solution to food and nutrition insecurity challenge.

Key words: Cultivars, Elemental, Local, Nutrition, Quality, Rice.

NSBMB/UPH/BT/034

Harnessing Sterile Insect Technology for Malaria Eradication in Nigeria: A Review

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ABSTRACT

Nigeria has the highest burden of malaria globally, accounting for nearly 27% of the global malaria cases. This review paper examines the potential of utilizing the Sterile Insect Technique (SIT) as an approach to combating malaria transmission in Nigeria. SIT is an environmentally friendly biological pest control method that involves the mass-rearing, sterilization via radiation, and systematic area-wide release of sterile male insects to mate with wild females, resulting in no viable offspring and a declining pest population. The review traces the history and principles behind SIT, which was first successfully deployed in the 1950s against the New World screwworm. SIT has since been effectively used as part component of area-wide integrated pest management programs against various insect pests, including mosquito species that transmit human pathogens. The review outlines the specific applications and advantages of using an SIT-based strategy targeting the Anopheles mosquitoes responsible for malaria transmission in Nigeria. These include the ability to induce permanent population replacement or suppression, overcome insecticide resistance, access cryptic breeding sites, minimize environmental impact by only affecting Anopheles, and garner public acceptance through male-only releases. However, integrating SIT with other control methods like insecticides, drugs and vaccines will likely be required to maximize its effectiveness towards malaria eradication in Nigeria.

NSBMB/UPH/BT/035

Biolarvicide Potential of Conidial Spores and Metabolites of Entomopathogenic Fungal Isolate (*Emericella nidulans*) Against Anopheles Mosquito Larvea

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ABSTRACT

This study investigated the conidial suspension and extracted secondary metabolites from entomopathogenic (*Emericella nidulans*) fungal isolates as potential bio-larvicide of Anopheles mosquitoes. *Emericella nidulans* was isolated from soil and identified using morphological and molecular characteristics. Anopheles mosquito was identified by morphological identification. Bioassay was performed to determine the isolate's biolarvicidal efficacy against the Anopheles mosquito's larvae. Four concentrations of conidial suspension; 9.2×10^4, 9.2×10^5, 9.2×10^6, and 9.2×10^7conidia/ml were formulated and tested, and mortality for each was recorded after 24,48, and72(hours) post-exposure. Secondary metabolites were extracted from fungal mycelia using three organic solvents; chloroform, diethyl-ether and ethyl-acetate, and four concentrations; 150, 300, 450, and 600µg/ml of each extract were

formulated and tested. Chloform extracts was compared with chemical insecticides; temephos and malathion and was characterized using GC-MS. Morphological and molecular characteristics of the isolate showed that; colonies have a green colour with distinct margins and are covered with fluffy well developed aerial plane mycelia on the surface, and it has 526bp that has the same clade as *Emericella nidulans strain IHB F 1876* in the cladogram and they are 98.07% identical. Conidial bioassay showed that mortality increases with increase in conidial concentration and exposure time (Table 4.2). Secondary metabolites's bioassay also shows increased mortality with increased extract concentration and exposure time. (Tables 4.3.1 to 4.3.3). Chloform extracts having recorded the least LC_{50} and highest mortality (67%) is considered the most effective and was compared to temephos and malathion that produces 100%mortality. GC-MS of Chloroform extracts showed the presence of 14 major bioactive compounds viz; 2,3,5,8-tetramethyl-Decane, Nonadecane, Sulfurous acid hexyl pentadecyl ester, 2-Hexyl-1-octanol, 1-Iodo-2-methylundecane, 2-methyltetracosane, 2-Bromotetradecane, 2-methyl Nonadecane, 2-Hexyl-1-Decanol, 2-methyl-Eicosane, 3-Trifluoroacetoxypentadecane, Heptacosane, 2-methylhexacosane, 1,2-dibromodecane. These results indicated the biolarvicidal potential of *Emericella nidulans* and could be used to develop biological control for mosquito management to avoid concerns associated with chemical larvicides.

NSBMB/UPH/BT/036

Effects of *Citrullus lanatus* (Thunb.) Matsum. & Nakai juice on PDX1 Gene Expression in the Pancreas of Streptozotocin-Induced Diabetic Wistar Rats

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ABSTRACT

Diabetes, a condition marked by hyperglycemia, glycosuria, and oxidative stress, is one of the world's top causes of mortality and currently has no effective treatment. The African watermelon, *Citrullus lanatus*, is well-known for its potential benefits in treating type-2 diabetes and cardiovascular disease. The present investigation examined the impact of *C. lanatus* juice on the expression of the pancreatic duodenal homeobox 1 (PDX1) gene in the pancreas of streptozotocin-induced diabetic Wistar rats. Thirty-six rats were randomly placed into six groups: normal control (NMC), diabetes control (DBC), diabetes rats administered metformin 500 mg/kg body weight (DBM), diabetes rats administered *C. lanatus* juice 200 mg/kg body weight (DBCL1), diabetes rats administered *C. lanatus* juice 500 mg/kg body weight (DBCL2), and diabetes rats administered *C. lanatus* juice 1000 mg/kg body weight (DBCL3). Animals were administered normal-diet fed (NDF) and fortified-diet fed (FDF) for

five weeks before STZ induction. The FDF group was administered 35 mg/kg body weight STZ. Diabetes confirmation and validation was done 72 hours and one-week post-induction respectively. After 14 days of treatment, blood and pancreatic tissue samples were collected for biochemical evaluation. *Citrullus lanatus* juice significantly (p<0.05) reduced fasting blood glucose in DBCL3. Significant (p<0.05) increase in antioxidants (catalase, superoxide dismutase, and glutathione peroxidase) was seen in all *C. lanatus*-treated groups, similarly, with significant (p<0.05) decrease in malondialdehyde. The PDX1 gene was significantly (p<0.05) up-regulated in a dose-dependent manner in all *C. lanatus* juice administered groups, as well as insulin, C-peptides, and high-density lipoprotein. *Citrullus lanatus* juice demonstrated beneficial effects on STZ-induced Wistar rats' antioxidant and lipid status, enhanced pancreatic beta-cell function, and reduced hyperglycemia. These findings highlight the need to use *C. lanatus* juice as a possible option for the development of reliable treatments for the management of diabetes mellitus.

Keywords: *Citrullus lanatus*, Gene expression, PDX1 gene, Type-2 diabetes, Watermelon-fruit juice

SUB-THEME 8

BIOINFORMATICS AND NANOTECHNOLOGY

NSBMB/UPH/BIN/001

Unraveling The Antiulcerogenic Mechanisms Of *Archachatina Marginata*-Derived Slime: *In Silico* And *In Vivo* Approaches

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ABSTRACT

The study investigates the antiulcerogenic mechanism of *Archachatina marginata* slime extract, focusing on its potency in inhibition of *Helicobacter pylori* urease and H^+/K^+-ATPase, and the slime protective potential against gastric ulcer induced by nonsteroidal anti-inflammatory drugs (NSAIDs). We characterized the bioactive components of *A. marginata* slime using gas chromatography mass spectroscopy (GC-MS), and performed molecular docking of the characterized compounds against urease and H^+/K^+-ATPase. The extracted snail slime, characterized by GC-MS, revealed 23 peaks representing 43 compounds. Molecular docking identified phenol, 2,6-bis (1,1-dimethylethyl) as a potent *Helicobacter* urease and H^+/K^+-ATPase inhibitor compared to standard inhibitors of the enzymes. Pharmacokinetic parameters indicated high gastrointestinal absorption for the identified compound, with selective BBB permeability and renal transport. Physicochemical properties showed compliance with Lipinski's rule of five. *In vivo* study using rats model demonstrates the extract significant ($p < 0.05$) protection against ulceration compared to untreated groups, with notable effects on gastric volume, acidity, and ulcer index. Biochemical analysis revealed significant differences ($p < 0.05$) in the levels of gastric mucin, prostaglandin enteroperoxidase 2 (PGE2), nitric oxide (NO), total protein (TP), total carbohydrate (TC), glutathione (GSH), superoxide dismutase (SOD), and catalase (CAT), between control and treated groups, suggesting *A. marginata* slime's potential gastroprotective and antioxidant effects. Histopathological examination showed erosion in the untreated group unlike the normal and tested groups that had normal mucosal architecture. These results suggest that *A. marginata* slime may employ mechanisms such as urease inhibition for *H. pylori* eradication, proton pump inhibition, cytoprotection and antioxidant potential against ulcer.

Keywords: Gastric ulcer, *Archachatina marginata,* Slime, Molecular Docking, Indomethacin.

NSBMB/UPH/BIN/002

Unveiling the Role of miR-320a in the Pathology of Coronary Artery Disease: *In Silico* and *In Vivo Analyses*

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ABSTRACT

Coronary artery disease (CAD) is a pervasive and life-threatening condition that significantly contributes to global morbidity and mortality. Despite advances in medical science, the early detection and effective treatment of the disease, remain formidable challenges. Existing therapeutic strategies primarily focus on symptomatic management and the prevention of further plaque accumulation, rather than addressing the underlying molecular mechanisms driving the disease. This study was designed to evaluate the potential of miR-320a as a biomarker of CAD. A computational analysis was performed to study the involvement of miR-320a in the disease pathology. Furthermore, a case-control study involving 100 human blood samples from CVD patients and 100 apparently healthy control subjects was conducted. qPCR was used to study the expression of the miRNA and some of its target genes in the human population. ELISA kits were used to assess the serum levels of insulin, adiponectin, and C-reactive protein (CRP). The diagnostic potential of miR-320a was evaluated with the EasyROC tool. The results of the present study show that miR-320a has a good binding pattern and perfect hybridization with the *AKT1*, *STAT3*, and *JAK2* genes. Further analysis revealed a significant upregulation ($P<0.05$) of miR-320a and a significant downregulation of the *AKT1*, *STAT3*, and JAK2 genes, validating the involvement of miR-320a in CAD pathology by implicating the JAK/STAT signaling pathway. miR-320a is positively correlated with insulin and CRP, but negatively associated with adiponectin. It was also observed that miR-320a possessed excellent diagnostic potential for CAD, with an area under the curve (AUC) of 0.876. It was suggested that miR-320a could be considered a good candidate for the diagnostic and therapeutic purposes of CAD.

Keywords: CAD, miR-320a, Pathology, Diagnosis, Therapeutics, Adiponectin

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In Silico And In Vitro Identification Of Inhibitory Properties Of Some Antihelminthic Drugs On Alkaline Phosphatase

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ABSTRACT

Some conditions are associated with elevated levels of alkaline phosphatase (ALP) in the body, making the inhibition of this enzyme a significant area of medical research. Levamisole is recognized as an effective inhibitor of alkaline phosphatase, but the inhibitory potential of benznidazoles and their *in-silico* interaction with alkaline phosphatase have not been fully explored. This study aimed to evaluate the kinetic and in silico effects of benznidazoles and levamisole on the hydrolytic activity of rat hepatic alkaline phosphatase. Spectrophotometric methods were used to assay enzyme activity in the absence and presence of the drugs. The maximum rate of reaction (Vmax) and Michaelis-Menten constant (Km) were estimated using Lineweaver-Burke plots. In silico simulations predicted the binding interactions of levamisole and benznidazoles with the active site of rat hepatic alkaline phosphatase. Levamisole at 0.1% w/v slightly reduced the Km from 0.942 mM to 0.823 mM, while at 0.5% w/v and 1% w/v, the Km increased to 1.342 mM and 1.043 mM, respectively. Benznidazoles at 0.1% w/v and 0.5% w/v increased the Km to 0.963 mM and 0.975 mM, respectively. The docking score, XP GScore, and prime energy values of levamisole interaction with rat hepatic alkaline phosphatase were -3.344, -3.606, and -3034.23, respectively, while for benznidazoles, they were -2.234, -2.888, and -20963.88, respectively. Levamisole non-competitively inhibited rat hepatic alkaline phosphatase activity at 0.1% w/v and inhibited by mixed-type at higher concentrations. Benznidazoles showed a similar pattern. The *in-silico* evaluation indicated levamisole has a higher inhibitory effect compared to benznidazoles. This study demonstrates that levamisole is a potent inhibitor of tissue non-specific alkaline phosphatase, while benznidazoles slightly inhibited the enzyme despite being in the antihelminthic class of drugs.

Keywords: Alkaline Phosphatase, In Silico, Inhibition

NSBMB/UPH/BIN/004

Molecular Docking Analysis of *Senna occidentalis* Constituents as Inhibitors of Aflatoxin O-Methyltransferase A (omtA)

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ABSTRACT

Agriculture and food industry face significant losses from fungal infections and aflatoxin contamination, affecting productivity, quality, and international trade. The study investigated the potential of seed extract components from Senna occidentalis to inhibit aflatoxin production using in silico methods. Molecular docking analysis was employed to elucidate the interactions and binding energies of these compounds against O-methyltransferase, a key enzyme involved in aflatoxin biosynthesis in fungi such as Aspergillus flavus and A. parasiticus. A homology model of Aspergillus flavus O-methyltransferase A was developed using the AlphaFold DB model of Aspergillus parasiticus sterigmatocystin 8-O methyltransferase as a template. The assessment of the model's quality indicated its suitability for subsequent molecular docking studies. The docking results revealed varying binding affinities of Senna occidentalis compounds towards O-methyltransferase. The reference compound, S-adenosyl-L-methionine, demonstrated the lowest binding energy, indicating its superior binding affinity for the enzyme. Among the Senna occidentalis compounds, diisooctyl phthalate displayed the lowest binding energy, followed by l-(+)-Ascorbic acid 2,6 dihexadecanoate, ethyl linolenate, phthalic acid, cyclobutyl isobutyl ester, and phthalic acid, cyclobutyl tridecyl ester. The hydrogen bond interactions of diisooctyl phthalate, l-(+)-Ascorbic acid 2,6-dihexadecanoate, and phthalic acid, cyclobutyl isobutyl ester with the S-adenosyl-methionine binding site of the enzyme suggest their potential to compete with this enzyme cofactor, thereby impeding the aflatoxin biosynthetic pathway. Additionally, the hydrogen bond interaction of l-(+)-Ascorbic acid 2,6-dihexadecanoate and ethyl linolenate with HIP 317, a proton acceptor in the enzyme's active site, could hinder the catalytic activity of the enzyme and the overall aflatoxin biosynthesis. These findings highlight the inhibitory potential of specific compounds from Senna occidentalis against aflatoxin production, providing a promising avenue for further investigation and development of natural-based strategies to mitigate aflatoxin contamination.

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Computer-aided discovery of 1-(Isopropylamino)-3-(1-naphthylmethoxy)-2-propanol, and 1,5-Dimethyl-4-[(4-nitro-benzylidene)-amino]-2-phenyl-1,2-dihydro-pyrazol-3-one derivatives from *Diospyros mespiloformis* and *Khaya senegalensis* stem bark extract as potential anti- Haematopoetic Cell Kinase, Extracellular signal regulated protein kinase and Deoxyhemoglobin: a combination of molecular docking and MMGBSA analyses

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ABSTRACT

Sickle cell disease (SCD) is the most common inherited haematological disorder in the world, primarily affecting people of African, Mediterranean, East Indian or Latin American descent. Nigeria stands out as the most sickle cell endemic country in Africa. The failure and toxicity associated with existing drugs necessitated the need for alternative search from plants acclaimed to have antisickling potentials. Diospyros mespiloformis (DM) and Khaya senegalensis (KS) are plants with acclaimed antisickling potentials but without scientific backings. This study investigated antisickling properties of DM and KS, using identified bioactive compounds present in the most effective sub-fractions using GCMS and LCMS and in silico studies against target such as; Haematopoetic Cell Kinase (HCK), Ca^{2+}-ATPase, Extracellular signal regulated protein kinase (ERK1), and Deoxyhemoglobin. Ligands were docked to the protein using the Glide docking procedure. Data were analyzed using standard softwares. The findings of the study were that: 1-(Isopropylamino)-3-(1-naphthylmethoxy)-2-propanol, and 1,5-Dimethyl-4-[(4-nitro-benzylidene)-amino]-2-phenyl-1,2-dihydro-pyrazol-3-one were the bioactive constituents in the sub-fractions of DM and KS with the higher binding affinity against HCK, ERK1 and Deoxyhemoglobin proteins. The study concluded that DM and KS exhibited in silico antisickling activities. The study recommends that DM and KS may be explored as safe alternative in the management of sickle cell disease.

Keywords: *Diospyros mespiliformis, Khaya senegalensis, In-silico studies,* GCMS, LCMS.

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In Silico Docking Analysis on Phytocompounds of *Anisopus mannii* for its Antidiabetic Activity

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ABSTRACT

Various α-glucosidase inhibitors such as acarbose, voglibose, and miglitol have been reported in literature and are adopted to decrease the postprandial blood glucose levels. Unfortunately, these drugs have many side effects such as diarrhea, abdominal pain and other gastrointestinal disorders in chronic therapy hence search for new natural substance with high α-glucosidase inhibitory activity and weak side effects became of great importance. This study aimed to identify novel inhibitors of alpha glucosidase from the extract of *Anisopus manni* for the

treatment of type II diabetes mellitus. The sample (*Anisopus mannii*) was collected from the campus of the University of Maiduguri. The active components were identified using Gas Chromatography-Mass Spectrometry (GC-MS) and docked with Autodock 4.0 program. The results of the docking studies of the identified phytomolecules with α-glucosidase enzyme (2CAG) revealed that these compounds possessed distinct affinities with the alpha-glucosidase enzyme, ranging from -6.05 kcal/mol (1-Allyl-cyclohexane-1,2-diol with CID7710) to -5.54 kcal/mol (CID_536559). The results however, showed that compound with CID_7710 had the best binding energy of -6.05 kcal/mol and formed a hydrogen bond with Arg51 and Arg54. Similarly the phytocompound with CID_138243 possess the binding affinity of -5.69 kcal/mol and formed a hydrogen bond with Arg51, Ser348 and interact with peptide of α-glucosidase through electrostatic interaction with Ser348. However, compound with CID_536995 had a minimum binding energy of -5.54 kcal/mol. The knowledge gained from this work can be further used in experimental studies to design α-glucosidase inhibitors involved in the diabetes mellitus.

Keywords: *Anisopus mannii*, diabetes mellitus, α-glucosidase, molecular docking

NSBMB/UPH/BIN/007

Genomic Determinants of Antibiotics Resistance and Virulence in *Morganella Morganii* Strains Isolated From Patients Diagnosed of Gastroenteritis Fever in Mararaba Nasarawa State.

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ABSTRACT

Morganella Morganii Is an Unusual Opportunistic Gram-Negative Bacterium of Enterobacteriaceae Family. It Is Regarded as An Emerging Pathogen and Implicated in Urinary Tract and Bloodstream Infections. This Study Investigated Molecular Antibiotics Resistance, Virulence and Pathogenic Determinants in Identified *M. Morganii* Strains.The *M. Morganii* Strains MM78 And MM26 Were Metagenomic-Assembled Genomes Binned from Sequenced Data Of Mixed Bacterial Culture Of Two Patients Diagnosed Of Gastroenteritis In Mararaba Community. The Isolates Were Sequenced with Illumina Novaseq 6000 Platform and Analysed with Various Bioinformatics Tools. MM78 Strain Contained Antibiotics Resistance Genes *Tet*d and *Cat*a2 and *Bla*mor-2, While MM26 Had *Bla*dha-18. Isehe3, And Isecl10 Insertion Sequences Were Identified in MM78 Strain. Virulence Genes Responsible for Immune Evasion, Antiphagocytosis, Efflux of Drugs, Stress Adaptation Andnutritional Virulence Were Identified In MM78 And MM26 As Characteristically Reported In *Klebsiella Sp.*, P*seudomonas Aeruginosa*, *Yersinia Sp.*, *Shigella Sp.*, And *Salmonella Sp.* Etc. Important

Phage-Related Genes Associated with Infection, Regulation, And Replication Namely *Nus*g, *Clp*b, *Clp*x, *Fts*h, *Gro*l and *Lex*a Were Also Identified. Investigation of These Molecular Determinants Will Help To Track Acquired/Evolved Traits Of *M. Morganii* Strains Which May Encourage Pathogenicity And Hinder Successful Treatment.

Keywords: *Morganela Morganii*, Pathogen, Virulence, Antibiotics Resistance, Genome

NSBMB/UPH/BIN/008

Antidiabetic Properties of Biosynthesized Silver Nanoparticles on Streptozotocin Induced Diabetic Wistar Rats.

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ABSTRACT

Several approaches have been adopted over the years to combat diabetes. Recent endeavours are focused on bio-nanotechnology that heralds the utilization of environmentally friendly methods of metal nanoparticle synthesis with biomaterials as reducing and stabilizing agents. This research assesses the antidiabetic properties of biosynthesized silver nanoparticles on streptozotocin induced diabetic Wistar rats and adopted the biosynthesis of silver nanoparticles (AgNPs), utilizing aqueous guava (*Psidium Guajava*) leaf as reducing and stabilizing agent. *Psidium Guajava* leaf extract contains gallic acid and caffeic acid, catechin and quercetin among others as key phytochemical components which give specific shapes and sizes on reducing 1 mM aqueous silver nitrate ($AgNO_3$). Thirty (30) albino Wistar rats weighing (120g - 230g) were used for the experiment. The rats were divided into five (5) groups of six (6) animals each. Group I: Normal control (NC), group II: diabetic control (DC), group III: standard control (Metformin), group IV: Silver nanoparticles (AgNPs) and group V: *Psidium guajava* leaves extract (GV) respectively. Groups 2 – 5 were injected intraperitoneally with a single dose of 60mg/kg of streptozotocin (STZ) reconstituted in sodium citrate ($Na_3C_6H_5O_7$) buffer adjusted to pH 4.5 after an overnight fast. Animals were observed for 48 hrs and blood glucose values of 200mg/dl and above confirmed diabetes induction. Group II received placebo treatment, group III received 200mg/kg metformin, group IV was treated with 20ml/kg of biosynthesized silver nanoparticles and group V was treated with 20ml/kg aqueous extract of *Psidum guajava.* Treatments lasted for fourteen (14) days and plasma blood glucose was checked at day 1, day 7 and day 14 after which the animals were sacrificed and blood collected by cardiac puncture for biochemical assay of serum insulin, antioxidant enzymes and lipid profile. Result analysis showed significant decrease in plasma glucose and serum insulin concentrations for silver nanoparticles treatment group (group IV) at $P<0.05$. Similarly, significant increase was observed for HDL cholesterol and decrease for TG, TC, VLDL and LDL-c in group IV at $P<0.05$. CAT, GSH and SOD activities were also significantly increased in group IV at $P<0.05$. This study shows that biosynthesized silver nanoparticles with aqueous

Psidium guajava leaf extract possesses β-cell regenerative activities as well as normo-glycaemic, normo-lipidemic and antioxidant potentials.

Keywords: Anti-diabetic**,** bio-nanotechnology, silver-nanoparticles, streptozotocin, phytochemicals.

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Molecular Characterization of Bacteria Isolate From Soil of Cattle Kraal in Oyo State College Of Agriculture and Technology, Igboora

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ABSTRACT

Soil serves as a host for diversity of many organisms with great potential to reform and to destroy. The soil bacteria were isolated by standard serial dilution plate techniques. Morphological characterization of the isolate was done by Gram's staining and biochemical characterization. Molecular characterization was conducted by DNA extraction and sequencing one of the bacteria isolates. Three Gram positive and three Gram-negative bacteria were isolated from this experimentation involving six genera. The frequency of occurrence of the organisms are as follows: *Bacillus cereus* is 25%, *Bacillus subtilis* and *Clostridium* spp are 16.7%, *Bacillus* spp, *Staphylococcus aureus*, *Enterobacter* spp, *Neisseria* spp and *Pseudomonas* spp are 8.3%. The DNA sequencing of isolate suspected to be *Pseudomonas* has 90.81% pair wise similarity with *Pseudomonas pseudoalcaligenes* strain SG-2 which has NCBI accession number JQ04008. Isolates from this study has potential to damage i.e. cause harm to our livestock and protect them. More studies should be conducted on maximizing the potential of the protective organism.

Keywords: Soil, Bacteria, Diversity, Molecular Characterization

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An *In-Silico* Analysis of Structural Prediction of Carboxylesterase in *Halomonas smyrnensis* AAD6 Designated as CEsHsAAD6.

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ABSTRACT

Carboxylesterases (EC 3.1.1.1) are one of the major lipolytic enzymes that play a key role in the hydrolysis activity. They can efficiently hydrolyze many structurally diverse compounds that contain a specific functional group, including, carboxylic acid esters, amides, and some thioesters. In addition to catalyzing hydrolysis, some carboxylesterases (CEs) are responsible for catalyzing synthetic and transesterification reactions. Bacterial CEs have made significant contributions in a few biotechnological processing and industries. In comparison to enzymes obtained from plants and animals, enzymes isolated from microorganisms are a more preferred source and less expensive. In this regard, the present study uses an in-silico studies, including structural prediction (such as physicochemical properties, secondary structure prediction and 3D homology modelling of protein sequences), binding site and tunnel prediction to provide relevant information about the enzyme (CEsHsAAD6) from the structural to functional basis. Physicochemical analysis such as length sequence, molecular weight, molecular formular and theoretical pI values were 222 amino acids, 23877.22 Da, $C_{1061}H_{1674}N_{302}O_{312}S_{7,}$ < 7 and acidic: 4.97 respectively, Additionally, random coils (40.09 %) and alpha helixes (35.59 %) make up the majority of CEsHsAAD6, however, hydrophilic amino acids predominated over hydrophobic ones, alanine constitutes 14.9%, aliphatic index and instability indexes were 99.91% and 50.55% respectively indicating highly unstable to a broad range of temperature. While SWISS MODEL depicted that CEsHsAAD6 has 46.70 % sequence congruence with the crystal structure of *Pseudomonas fluorescens* carboxylesterase (PDB 1AUR). COACH-D algorithm and quantum tunnel prediction were used to predict active sites of the CEsHsAAD6 proteins. The result revealed five poses of the active site, with the predicted binding energy ranging from – 5.8 to – 3.4 mol/kcal of the protein. For authentication of the result pose with lowest binding energy was subjected to the Caver 3 webserver for quantum tunnelling of the best active site binding pose. However, the fourth active site position for the CEsHsAAD6 revealed five tunnels corresponding to a length and radius of 28.2 Å and 0.9 to 2.5 Å.

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Evaluation of Central Repeats and Haplotype on *Plasmodium falciparum* Circumsporozoite Gene in Isolates Obtained from Ore, Osun State, Nigeria

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ABSTRACT

The global burden of malaria persists, prompting the approval of the RTS, S vaccine for widespread use in children by the WHO in 2021. However, the efficacy of this vaccine is influenced by genetic variations in the *Plasmodium falciparum* circumsporozoite protein (PfCSP), particularly within African populations where malaria remains endemic. This study aims to assess the potential impact of PfCSP diversity on the future deployment of the RTS, S vaccine in Nigeria. The PfCSP central repeat prevalence and haplotypes was evaluated in asymptomatic school children aged 5-17 in Ore town, Osun State, Nigeria, using rapid diagnostic tests to confirm *Plasmodium falciparum* infection in blood samples from 75 school children. Genomic DNA was extracted from dried blood spots, and Nested PCR amplification targeted the central repeat region of the CSP gene. Sanger sequencing technique was used to sequence the amplicons. Overall, 50 of the 75 samples considered for this study were successfully amplified and sequenced. The Geneious prime program was used to analyze polymorphic characteristics revealing the presence of three predominant haplotypes: NANP, NVDP, and NPDP, with NANP being the most prevalent in 50 out of the 75 samples. The number of NANP repeats ranged from 1 to 35, while NVDP ranged from 1 to 4, with only one variant of NPDP reported. Findings from this study highlights the polymorphic nature of the PfCSP central repeat region in *Plasmodium falciparum* isolates among asymptomatic children in Ore, Osun state. This diversity may predict innate reduced effectiveness of the RTS, S vaccine when deployed in Nigeria. Understanding PfCSP polymorphisms is crucial for optimizing malaria control strategies and vaccine development efforts in endemic regions.

Keywords: Polymorphism, RTS, S vaccine, Central repeats, Circumsporozoite protein, *Plasmodium falciparum*, Malaria, Haplotypes, Mutation, Age.

NSBMB/UPH/BIN/012

In-Silico Analysis of Anti-Inflammatory Potentials of Catechin, Kaempferol and Naringenin from *Hibiscus sabdariffa* Seeds Against Topoisomerase II and Cyclooxygenase II

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ABSTRACT

Topoisomerase-II (TOP-II) and Cyclooxygenase II (COX-II) have long been implicated in several conditions including cancer, leukemia, neurological disorders and Inflammation. In the current study, *in silico* investigation of anti-inflammatory activities of selected constituents of hydromethanolic extract of *Hibiscus sabdariffa* seeds against TOP-II and COX-II was carried out. *Hibiscus sabdariffa* seeds were collected from Plateau State (Mangu Local Government Area), Nigeria. Chromatographic studies (GC-FID and GC-MS) were carried out to identify the phytochemicals and bioactive components of the sample. The physicochemical characteristics, pharmacokinetics, drug-likeness, and medicinal chemistry properties were evaluated using the web-based computer model SwissADME. Flavonoids including catechin, kaempferol and naringenin were then selected for further molecular docking against TOP-II and COX-II, which are involved in inflammatory effects alongside known standards. The enzymes were retrieved from protein data bank (https://www.rscb.org), while the ligands were downloaded from PubChem database (https://pubchem.ncbi.nlm.nih.gov). Biovia Discovery Studio was used for both enzyme preparation and result visualization, while PyRx was used for docking using Autodock environment. The Result of the ADME profiling showed that the selected compounds had favourable drug-likeness properties. Further, molecular docking analysis showed positive interactions of COX-II with catechin, kaempferol and naringenin with binding affinities of -7.2, -7.4 and -7.7 kcal/mol respectively, outperforming the standard drugs ibuprofen and aspirin with binding affinities of -5.8 and -5.6 kcal/mol respectively. Topoisomerase-II interactions with catechin and naringenin showed -8.3 and -8.4 kcal/mol respectively as binding affinities, outperforming standard drugs mitoxantrone with binding affinity of -7.0 kcal/mol, while kaempferol outperformed both mitoxantrone and etoposide with binding affinity -8.4 kcal/mol. The results showed that catechin, kaempferol and naringenin may be better compounds that can be used to inhibit topoisomerase-II and COX-II activities, thereby salvaging inflammatory effects in inflammation-related diseases.

Keywords: Anti-inflammatory compounds, Drug-likeness properties, GC-MS, *Hibiscus sabdariffa* seeds, Inflammation, *In silico* analysis.

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Molecular Docking Studies of Anti-Inflammatory Activities of Some Chemical Constituents of Hydromethanolic Extract of *Hibiscus sabdariffa* Seeds as Cyclooxygenase and 5-Lipooxygenase Inhibitors

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ABSTRACT

This study explored the anti-inflammatory potential of chemical constituents derived from the hydromethanolic extract of *Hibiscus sabdariffa* seeds through molecular docking. Inflammation, a complex biological response linked to various diseases, is regulated by cellular signalling pathways involving key enzymes like cyclooxygenase-2 (COX-2) and and 5-lipoxygenase (5-LOX). The seeds underwent meticulous preparation, air-drying, grinding into powder, and extraction using a hydromethanol solvent. Subsequent phytochemical analysis, coupled with gas chromatography-flame ion detector (GC-FID) and gas chromatography-mass spectrometry (GC-MS) quantification, provided a detailed profile of the extract's chemical composition identified 30 compounds. Through ADMET analysis the phytochemicals from *Hibiscus sabdariffa* seeds were analyzed. Compounds including naringenin, kaempferol, 9,17 octadecadienal (Z), and catechin, were subjected to molecular docking analysis using COX-2 and 5-LOX as target enzymes. Computational investigations employing PyRx v0.8, Biovia Discovery Studio Visualizer v21.1.0.20298, and Autodock Tools 1.5.7 revealed intricate binding modes and favourable interactions between the selected ligands and the active sites of COX-2 and 5-LOX. Notably, the ligands exhibited higher binding affinities compared to standard drugs diclofenac and indomethacin for COX-2. Similarly, for 5-LOX, kaempferol and naringenin displayed compelling binding patterns, surpassing the binding affinities of zileuton and licofelone, established 5-LOX inhibitors. The binding affinities for COX-2 were as follows: naringenin (-8.9 kcal/mol), kaempferol (-8.8 kcal/mol), catechin (-9 kcal/mol), and 9,17 octadecadienal (z) (-5.2 kcal/mol). For 5-LOX, the affinities were: naringenin (-9.2 kcal/mol), kaempferol (-9.4 kcal/mol), catechin (-8.9 kcal/mol), and 9,17 octadecadienal (z) (-5.7 kcal/mol). Standard drugs diclofenac and indomethacin exhibited binding affinities of -7.5 kcal/mol and -8.3 kcal/mol for COX-2 respectively, while zileuton and licofelone had binding affinities of -7.5 and (-9.0 kcal/mol for 5-LOX respectively. These findings provide molecular insights into the potential anti-inflammatory activities of specific compounds from *Hibiscus sabdariffa* seeds. The observed interactions *in silico* warrant further experimental validation, supporting the notion that these natural compounds could serve as promising lead molecules for the development of dual-action COX-2 and 5-LOX inhibitors, thereby contributing to the modulation of inflammation-associated pathways.

Keywords: Anti-inflammatory compounds, Binding Affinity, Gas Chromatography-Mass Spectrometry, *Hibiscus sabdariffa* seeds, Kaempferol, Molecular Docking, Naringenin,

NSBMB/UPH/BIN/014

RNA-sequencing and *In-silico* Approaches Revealed Potential Receptor Genes for Dengue virus Serotypes

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ABSTRACT

Dengue virus infects vulnerable cells by first binding to host cell surface receptors. Reports have shown that receptor usage could be cell and serotype specific. We used a combination of RNA-seq data and Gene Ontology resources (GO) for biological processes and molecular functions. Our study revealed virus entry and receptor activity as enriched gene pathways. We discovered ACE2, Nectin-1, Nectin-2, PHB, and TMPRSS2 receptor genes shared by RNA-seq data and five GO pathways. We also found EPN1, EPN2 and LDLR receptor genes common in the endocytosis gene pathways analysed by computational tools. The top 10 hub genes, including ITGB1, CDH17, ARRB2, SHC1, HSPA1A, HSPE1, PHB, HSPA8, CD81, and ANXA2 were visualised through the Cytoscape cytoHubba plugin upon protein-protein interaction in STRING. We identified PHB, which corresponds to earlier findings from RNA-seq data and GO pathway enrichment analysis. The results from our integrative bioinformatics analysis were further validated *in vitro* by studying the protein expression of target genes (Nectin-1, Nectin-2, PHB1, PHB2 and EPN1) using qRT-PCR and western blot assay. *In vitro* studies of targeted receptor genes confirmed their expression and upregulation. Our findings provide new insight and additional information on DENV potential receptor genes, which lays a foundation for further investigations.
Keywords: Dengue virus; DENV4 NS1; RNA-seq analysis; Gene Ontology; Receptor genes

NSBMB/UPH/BIN/015

In-Vitro Anti-Inflammatory Properties, GC-MS and Molecular Docking Analyses of Ethanol Leaf Extract of *Irvingia gabonensis*

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ABSTRACT

Inflammation is a natural body defense mechanism of the immune system against injurious agents including toxicants, pathogens, damaged cells and irradiation. The aetiologies of a number of disease conditions such as arthritis, cancer and hypertension have been linked to chronic inflammation. *Irvingia gabonensis* (Bush mango) leaves are used for various medicinal purposes by locals and this has been corroborated by scientific investigations. The present study therefore investigated the *in vitro* anti-inflammatory properties, gas chromatography-mass spectroscopic (GC-MS) and molecular docking analyses of ethanol leaf extract of *Irvingia gabonensis.* Standard methods were employed in carrying out all analyses. Ethanol leaf extract of *Irvingia gabonensis* potently inhibited Nuclear factor-kappa B (NF-kB), Cyclooxygenase-2 (COX-2), Angiotensin-converting enzyme (ACE), Interleukin-6 (IL-6) and Tumor necrosis factor-α (TNF-α) in concentration-based manner when compared with the reference standard drugs. GC-MS analyses of the ethanol leaf extract of *Irvingia gabonensis* showed its content of 140 compounds with 39 having medicinal properties / biological activities including but not limited to anti-inflammatory, antioxidant and antimicrobial activities. Molecular docking of these compounds revealed the hit compounds: Xanthumin; Naphthalene, 2,7-dimethyl- and Naphthalene, 1,3-dimethyl-, as having lower binding energies and good hydrogen bonding and hydrophobic interactions with the active site residues of ACE and COX-2. Xanthumin had the least binding energy and strongest interactions with ACE and COX-2. It is concluded that ethanol leaf extract of *Irvingia gabonensis* leaf may be useful in mitigating chronic inflammation and its associated disease conditions.

Keywords: *Irvingia gabonensis,* Molecular docking, Inflammation, Anti-inflammatory, Gas Chromatography-Mass Spectroscopy

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Exploring the Effect of Bioactive Compounds From Ethyl Acetate Fraction of *Hyptis verticillata* jacq Plants as Potential Anti-Diabetic Agents; DFT, Molecular Docking and Pharmacokinetic Studies

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ABSTRACT

Hyptis verticillata jacq is a tropical plant widely explored for its anti-diabetic properties. The leaf extract fractions of the *H. verticillata* was theoretically investigated for its anti-diabetic potential. Theoretical investigation utilized the density functional theory (DFT) at B3LYP/def2SVP level of theory. From the frontier molecular orbital analysis, the high the ionization potential values obtained reflected greater stability of the bioactive compounds resulting in enhanced absorptivity in biological systems. The natural bond order (NBO) gave insight into the second order perturbation energy (E^2) revealing the intense molecular interactions in the increasing order of 2-Chloropropionic acid (289.56Kcal/mol) > 1, 4-Eicosadiene (91.45 Kcal/mol)> Naphthalene (89.23Kcal/mol)>2-amino-1-phenylethanol (57.22Kcal/mol) > Benzoic acid (50.23 Kcal/mol). The density of states (DOS), the overlap population density of states (OPDOS) and the partial density of states (PDOS) and the Partial density of states (PDOS) showed the various individual contributions obtained from the different molecular orbitals**.** Molecular docking simulations were performed to investigate the inhibition potential of the biologically active compounds on α-amylase and α-glucosidase. The bioactive compounds were highly promising with higher binding affinities. Comparatively, the bioactive compounds had greater inhibitory effect on α-amylase and α-glucosidase than Miglitol compared to Acarbose which were the standard drugs used. The pharmacokinetic investigation showed good gastro-intestinal absorption and oral bio-availability, solubility in aqueous medium. The toxicity studies show their inactivity to cytotoxicity. These results provide compelling evidence supporting the pharmacological suitability of *H. verticillata* plant extract for use as highly promising anti-diabetic agent.

Keywords: DFT, *In-silico* molecular docking, *Hyptis verticillata jacq* plant, ADMET.

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Innovative DNA Vaccine Candidate Against *Trypanosoma congolense*: Harnessing Membrane Bound Acid Phosphatase

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ABSTRACT

Animal African Trypanosomiasis (AAT) caused majorly by *Trypanosoma congolense*, poses a significant threat to livestock health and agricultural productivity across sub-Saharan Africa. Current treatment and control methods are limited by resistance and toxicity to the few, old available drugs, necessitating novel approaches for diseases control. This study explores the development of a DNA vaccine candidate targeting *T. congolense*, utilizing its native Membrane Bound Acid Phosphatase (MBAP) which is type I membrane protein less susceptible to variation and has been demonstrated to play a central role in molecular trafficking in the blood stream form of the parasites and proven essential by RNAi . Genomic DNA was extracted from locally sourced *T. congolense*, molecularly identified and used to optimize the PCR amplification conditions of the MBAP gene. We successfully cloned and expressed the MBAP gene from *T. congolense*, incorporating it into a transin signal peptide and Strep-Tag modified mammalian expression vector pVAX1 to enhance the immunogenicity and expression efficiency of the vaccine construct. The construct was used to transform *Escherichia coli* BL-21 (*DE3*) and positive clones were confirmed by colony PCR, purified and sequenced to obtain the DNA vaccine construct namely MBAP-pVAX1.The subcellular localization of the construct was carried out by Immunofluorescence Assay (IFA) of HepG2 cells transfected with the construct. The locally sourced trypanosomes stabilate was found to be *T. congolense* savannah or forest type. Sequencing the construct revealed the presence of two consistent discrepancies on the analyzed sequences from the native *T. congolense* as compared to the TritrypDB retrieved sequence where Serine was changed to Proline (for the first discrepancy) and Isoleucine changed to Valine (for the second). *In vitro* analyses demonstrated robust expression in the secreted form of the MBAP antigen in mammalian cells transfected with the construct. Further optimization and extensive *in vivo* testing are warranted to fully assess the vaccine candidate's protective efficacy and potential application in livestock.

Keywords: *Trypanosoma congolense*, Membrane Bound Acid Phosphatase, Transin Signal peptide, Strep-Tag.

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An *In-silico* Structural Characterization of Azoreductase in *Halomonas smyrnensis* AAD6 Designated As azoHsAAD6.

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ABSTRACT

Azoreductases (EC 1.7.1.6) are diverse flavoenzymes widely present among microorganisms and higher eukaryotes. This enzyme is mainly involved in the biotransformation and detoxification of azo dyes, nitro-aromatic, and azoic drugs. Reduction of azo bond and reductive activation of pro-drugs at initial level is a crucial stage in degradation and detoxification mechanisms. Using azoreductase-based microbial enzyme systems that are biologically accepted and ecofriendly demonstrated complete degradation of azo dyes. Theoretical pI: 4.87. In this regard, the present study uses an in-silico studies, including structural prediction (such as physicochemical properties, secondary structure prediction and 3D homology modelling of protein sequences), binding site and tunnel prediction to provide relevant information about Azoreductase designated as azoHsAAD6 in *Halomonas smyrnensis* AAD6. Physicochemical analysis such as length sequence, molecular weight, molecular formular and theoretical pI values were 199 amino acids, 21422.37 Da, $C_{940}H_{1518}N_{268}O_{291}S_6$, < 7 and acidic: 4.87 respectively, Additionally, random coils (32.16 %) and alpha helixes (43.22 %) make up the majority of azoHsAAD6, however, hydrophilic amino acids predominated over hydrophobic ones, leucine constitutes 15.1%, aliphatic index and instability indexes were 105.48% and 38.23% respectively indicating highly stable to a broad range of temperature. While SWISS MODEL depicted that azoHsAAD6 has 43.15 % sequence congruence with the crystal structure of AzoR (PDB 8H4J). COACH-D algorithm and quantum tunnel prediction were used to predict active sites of the azoHsAAD6 protein. The result revealed five poses of the active site, with the predicted binding energy ranging from – 4.6 to – 3.7 mol/kcal of the protein. For authentication of the result pose with lowest binding energy was subjected to the Caver 3 webserver for quantum tunnelling of the best active site binding pose. However, the fourth active site position for the azoHsAAD6 revealed four tunnels corresponding to a length and radius of 12.1 Å and 1.3 to 3.2 Å.

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Single-Cell RNA seq Analysis of Erythroid Cells Reveals a Specific Sub-Population of Stress Erythroid Progenitors

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ABSTRACT

Erythroid cells play important roles in hemostasis and disease. However, there is still significant knowledge gap regarding stress erythropoiesis. Two single-cell RNAseq datasets of erythroid cells deposited on GEO with accession numbers GSE149938 and GSE184916 were obtained. The datasets from two sources, bone marrow and peripheral blood were analyzed using Seurat v4.1.1, and other tools in R. QC metrics were performed, data were normalized and scaled. Principal components that capture the variation of the data were determined. In clustering the cells, KNN graph was constructed and Louvain algorithm was applied to optimize the standard modularity function. Clusters were defined via differential expression of features. We identified 26 different clusters that were grouped into 9 different cell types, with a particular cluster representing the stress erythroids. The clusters showed differentially expressed genes as observed from the gene signature plot. The stress erythroid cluster differentially expressed some genes including ALAS2, HEMGN, and GUK1. The erythroid population was found to be heterogeneous, with a distinct sub-cell type constituting the stress erythroids; this may have important implications for our knowledge of steady-state and stress erythropoiesis, and the markers found in this cluster may prove useful for future research into the dynamics of stress erythroid progenitor cell differentiation.

Keywords: Erythroid cells; Transcriptomics; scRNA seq; Erythrocytes; Stress erythropoiesis

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Isolation and Purification of Recombinant Soluble Methane Monooxygenase (Smmo) From Mutant *Methylosinus trichosporium* Ob3b

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ABSTRACT

Immobilized metal affinity chromatography (IMAC) (Ni-NTA column) was used to purify a recombinant His-tagged hydroxylase component of soluble methane monooxygenase

(sMMO). Mutant strains of *Ms. Trichosporium* OB3b (pT2MLY C151S and R98L) developed to express His-tagged recombinant sMMO, and facilitate efficient purification were grown on NMS culture media under low copper concentration, spectinomycin and streptomycin were used to select the cells. Plates were stacked in a 2L sandwich box furnished with silica gel to cob perspiration and cells incubated at 30˚C, methane gas was constantly being injected into the box for ten days as source of carbon and energy, and cells were harvested at exponential growth phase and broken using French press. Cell extracts obtained were applied onto 1mL Ni-NTA column following the activation of the column with low imidazole phosphate binding buffer, eluates were collected using high imidazole buffer into 5 fractions each and run on SDS-PAGE to analyze the components of the extracts. Preliminary whole cell naphthalene enzyme assay gave a positive result for the sMMO. Results from SDS-PAGE and silver staining showed the presence of all the 3 subunits of the hydroxylase component, the overall outcome of the experiment shows the 3 subunits of the enzyme was successfully purified using Ni-NTA Agarose column.

Keywords; Recombinant Soluble methane monooxygenase (rsMMO), Mutant *Methylosinus trichosporium* OB3b, Ni-NTA column.

NSBMB/UPH/BIN/021

Prevalence and Molecular Identification of Human Papilloma Viruses Among Female Patients Attending Selected Hospitals in Kebbi State, Nigeria

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ABSTRACT

Human papilloma viruses (HPV) are responsible for most of the cervical cases in Nigeria with regional variation observed in the prevalence within the country. Limited data on HPV in Kebbi State necessitated this research with the aim of determining the prevalence and risk factors associated with the disease among female patients attending selected hospitals in Kebbi State. Four hundred and eighty five (485) cervical samples collected from five major hospitals in each Emirate of the state were screened for the presence of HPV using ELISA IgA and IgG kits. Positive samples were further confirmed using Nested PCR. Socio-demographic and Risk factors associated with the rate of infection were obtained using a structural questionnaire. This

research established Prevalence of 24(4.95%) HPV infection from the samples screened, out of which, 15(3.09%) and 9(1.86%) women responded to IgA and IgG antibody. High prevalence of 23(4.74%) among married and 1(0.21%) among unmarried women was recorded. The risk factors associated with the rate of infection revealed 6(1.24%) pregnant women in their second trimester, women with STD were observed with 6(1.24%), all the women recruited were not vaccinated, with few 10(2.06%) women who had knowledge of the disease. The gel electrophoreses revealed the length of amplified HPV DNA at 150bp position which indicates positive result. In conclusion, the prevalence rate of HPV in the study area is low compared to other parts of the country, therefore, there is need for intense public awareness and implementation of early detection screening, treatment and vaccination to prevent a wide spread of HPV infection within the study area and other parts of the country.

Keywords: HPV, Cervical, PCR, DNA, IgA and IgG antibody

NSBMB/UPH/BIN/022

Molecular Docking Analysis of *Senna occidentalis* Constituents as Inhibitors of Aflatoxin O-Methyltransferase A (Omta)

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ABSTRACT

Agriculture and food industry face significant losses from fungal infections and aflatoxin contamination, affecting productivity, quality, and international trade. The study investigated the potential of seed extract components from Senna occidentalis to inhibit aflatoxin production using in silico methods. Molecular docking analysis was employed to elucidate the interactions and binding energies of these compounds against O-methyltransferase, a key enzyme involved in aflatoxin biosynthesis in fungi such as Aspergillus flavus and A. parasiticus. A homology model of Aspergillus flavus O-methyltransferase A was developed using the AlphaFold DB model of Aspergillus parasiticus sterigmatocystin 8-O methyltransferase as a template. The assessment of the model's quality indicated its suitability for subsequent molecular docking studies. The docking results revealed varying binding affinities of Senna occidentalis compounds towards O-methyltransferase. The reference compound, S-adenosyl-L-methionine, demonstrated the lowest binding energy, indicating its superior binding affinity for the enzyme. Among the Senna occidentalis compounds, diisooctyl phthalate displayed the lowest binding energy, followed by l-(+)-Ascorbic acid 2,6 dihexadecanoate, ethyl linolenate, phthalic acid, cyclobutyl isobutyl ester, and phthalic acid, cyclobutyl tridecyl ester. The hydrogen bond interactions of diisooctyl phthalate, l-(+)-Ascorbic acid 2,6-dihexadecanoate, and phthalic acid, cyclobutyl isobutyl ester with the S-adenosyl-methionine binding site of the enzyme suggest their potential to compete with this enzyme cofactor, thereby impeding the aflatoxin biosynthetic pathway. Additionally, the hydrogen bond interaction of l-(+)-Ascorbic acid 2,6-dihexadecanoate and ethyl linolenate with HIP 317, a proton acceptor in the enzyme's active

site, could hinder the catalytic activity of the enzyme and the overall aflatoxin biosynthesis. These findings highlight the inhibitory potential of specific compounds from Senna occidentalis against aflatoxin production, providing a promising avenue for further investigation and development of natural-based strategies to mitigate aflatoxin contamination.

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A Review on Virulence Factors of *E. Coli* focus on Esbls Genes and Associated Genes.

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ABSTRACT

This study was done to assess the occurrence of virulence factors and correlation of phylogenetic grouping in ESBLs producing E. coli. Twenty-seven ESBLs producing E. coli. Detection of genes encoding virulence factors, pathogenicity associated marker (PAI) and phylogenetic groups were studied by PCR. The correlation of E. coli phylogenetic grouping with the virulence factors was studied. The clonal relationships between the isolates were tested by pulsed-field gel electrophoresis (PFGE). Overall, 44.4% of the 27 E. coli isolates belonged to phylogroup B2, 44.4% to D and 11.2% to A. Among the isolates, fimH, traT and fimA were the most frequent virulence genes and were found over 85% of the isolates. PAIs was found in 8 isolates while the tcpC gene was detected in one isolate. The overall prevalence of PAI was higher in group B2 as compared to groups A and D ($p<0.043$). A clonal diversity was confirmed among our isolates (27 unrelated PFGE profiles). We report for the first time the prevalence of tcpC as a new virulence marker and PAI in clinical ESBLs-producing E. coli. This study indicates that most of the ESBL- positive isolates showed virulence genes and most strains belonged to phylogenetic groups B2 and D. The study suggested that high number of virulence genes in studied strains may be important factors in the infection's development.

Key Words: virulence factors, phylogenetic grouping, ESBLs Gens, E. Coli focus, Associated Gens

NSBMB/UPH/BIN/024

In silico analysis of the HSP90 Chaperone System From the African trypanosome, *Trypanosoma brucei*

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ABSTRACT

African trypanosomiasis is a neglected tropical disease caused by *Trypanosoma brucei* (*T. brucei*) and spread by the tsetse fly in sub-Saharan Africa. The trypanosome relies on heat shock proteins for survival in the insect vector and mammalian host. Heat shock protein 90 (HSP90) plays a crucial role in the stress response at the cellular level. Inhibition of its interactions with chaperones and co-chaperones is being explored as a potential therapeutic target for numerous diseases. In this study we provided an *in silico* overview of HSP90 and its co-chaperones in both *T. brucei brucei* and *T. brucei gambiense* in relation to human and other trypanosomal species, including non-parasitic Bodo saltans and the insect infecting Crithidia fasciculata. A structural analysis of *T. brucei* HSP90 revealed differences in the orientation of the linker and C-terminal domain in comparison to human HSP90. Phylogenetic analysis displayed the *T. brucei* HSP90 proteins clustering into three distinct groups based on subcellular localizations, namely, cytosol, mitochondria, and endoplasmic reticulum. Syntenic analysis of cytosolic HSP90 genes revealed that *T. b. brucei* encoded for 10 tandem copies, while *T. b. gambiense* encoded for three tandem copies; *Leishmania major (L. major)* had the highest gene copy number with 17 tandem copies. The updated information on HSP90 from recently published proteomics on *T. brucei* was examined for different life cycle stages and subcellular localizations. The results show a difference between *T. b. brucei* and *T. b. gambiense* with *T. b. brucei* encoding a total of twelve putative HSP90 genes, while *T. b. gambiense* encodes five HSP90 genes. Eighteen putative co-chaperones were identified with one notable absence being cell division cycle 37 (Cdc37). These results provide an updated framework on approaching HSP90 and its interactions as drug targets in the African trypanosome

Keywords: Bioinformatics, *in silico, T. brucei*, trypanosomiasis, Chaperones HSP90, Drug Targets

NSBMB/UPH/BIN/025

Antidiabetic Effects of *Parkia biglobosa* Aqueous Stem Bark Extract on Type 2 Diabetic Rats and Molecular Docking of its Identified Phytochemicals on Dipeptidyl Peptidase IV

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ABSTRACT

Parkia biglobosa has been used in folk medicine to treat diabetes. The study aims to study the antihyperglycemic, antioxidative, renal, and hepatic protective effects of *P.biglobosa* aqueous stem bark extract (PASE) on type 2 diabetic mellitus rats. High fat diet, and 35 mg/Kg body weight of streptozotocin was used to induce T2DM, and the compounds of the gas chromatography mass spectrometry (GCMS) profile of the extract was docked on dipeptidyl peptidase IV (DPP-IV) using Auto dock vina, and discovery studio to visualise the interactions. The experimental design was made of normal control group, diabetic control group, diabetic plus 200 mg/kg PASE treated group, diabetic plus 400 mg/kg PASE treated group, and diabetic plus metformin treated group. The result of the study shows that the groups treated with PASE were able to significantly ($P<0.05$) ameliorate their high blood glucose level, reduced the serum alanine aminotransferase, aspartate aminotransferase, urea and creatine levels, and increased the catalase and superoxide dismutase activities when compared to the diabetic control group. The ameliorative effect of PASE treated groups on hyperglycemic, oxidative stress, renal and hepatic protective parameters was relatively comparable to the metformin groups which is the standard clinical drug used in this study. The GCMS result identified seventeen compounds of which oleic acid had the highest abundance with peak area of 38%. 9,12-Octadecadienoic acid, methyl ester, (E, E)- had the best binding energy to DPP-IV of -6.2 Kcal/mol. Sitagliptin which is the standard clinical drug had a binding energy of -9.5 Kcal/mol. In conclusion, PASE possess antihyperglycemic, antioxidative, renal and hepatic protective effects and contain compounds that could inhibit DPP-IV.

Keywords: *Parkia biglobosa*, Antihyperglycemic, Antioxidative, Dipeptidyl peptidase IV, Molecular docking.

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Molecular Docking Studies to Evaluate the Antimicrobial Potential of *Boswellia* Essential Oil

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ABSTRACT

The control and treatment of bacterial infection primarily causing resistant to most available antibiotics is a major concern of public health. Antimicrobial compounds derived from natural resources, such as plant extracts, essential oils, and peptides, are attracting interest for their activity against various microorganisms in the hope that, unlike antibiotics, they will be effective without causing resistance. This study aimed at using *in silico* model to assess the antimicrobial activity of *Boswellia* essential oil (BEO). The composition of the essential oil was identified from the Gas Chromatography-Mass Spectrometry (GC-MS). Molecular docking was carried out to show the binding interaction of the compounds identified from the essential oil against tyrosyl-tRNA synthetase (TyrRS), DNA gyrase, peptide deformylase (PDF) and 1,3-β-glucan synthase. The major compounds identified by GC-MS were α-pinene and limonene. Interesting binding interaction was established between the compounds and TyrRS (- 7.4 kcal/mol to -3.2kcal/mol), DNA gyrase (-7.1 kcal/mol to -4.4 kcal/mol), PDF (-7.6 kcal/mol to -4.7 kcal/mol) and 1,3-β-glucan synthase (-7.6 kcal/mol to -3.1 kcal/mol). Additionally, compounds with low abundance (geranyl acetate, cinnamaldehyde, (E), eugenol) demonstrates high score for the hydrogen-bond in the visualized interaction. Overall, the *in silico* molecular model exhibited by the interaction of the molecules conforms with high binding affinity, stable complex with specific hydrogen bonds and hydrophobic interactions between the compounds of BEO and the amino acids found in the binding pockets of the microbial proteins. Potentially, the strength and nature of the interaction between the molecules indicates greater biological activity of the *Boswellia* essential oil.

Keywords: *Boswellia* essential oil, GC-MS, antimicrobial activity, molecular docking

NSBMB/UPH/BIN/027

Molecular Docking Study and Pharmacokinetic Profiling of Selected Phytochemicals with Estrogen Receptors as Anti-breast cancer compounds.

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ABSTRACT

A Molecular docking study and pharmacokinetic profiling were carried out on 15 selected phytochemicals with estrogen receptor PDB ID 8AOY. The Phytochemicals were found to have a strong binding affinity toward the target receptor with binding energy ranging from -6.5kcal/mol to -9.8kcal/mol. 4-methoxy coumestrol was found to have the highest binding affinity when docked with the target receptor, with a binding energy of -9.8kcal/mol. A Pharmacokinetic study carried out on the 15 phytochemicals shows that all the phytochemicals obey Lipinki's rule of 5 without single violation proving their strong degree of bioavailability. The binding affinity of 4-methoxycoumesterol was found to be higher than that of anastrozole an FDA-approved drug targeting estrogen receptors for the treatment of breast cancer. The phytochemical 4-methoxy coumestrol is subject to further study in designing a potent anti-breast cancer drug targeting estrogen receptor.

NSBMB/UPH/BIN/028

Molecular Docking Screening of Phytoconstituents From *Ipomoea batats* Leaf With Antidiabetes and Anti-Inflammatory Properties

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ABSTRACT

Glutamine:fructose-6-phosphate amidotransferase (GFAT) is a rate-limiting enzyme in the hexoamine biosynthetic pathway and plays an important role in type 2 diabetes. Lipoxygenases (LOXs) are a key part of several signaling pathways that lead to inflammation and Inflammation mediated immune cell alterations are associated with diseases such as diabetes. This study applied molecular docking in identifying the potential use of bioactive compounds from *Ipomoea batats* leaf for diabetes and inflammation treatment. The bioactive compounds in *Ipomoea batats* were identified using GC-FID as I8 were selected. These compounds were docked against Glutamine:fructose-6-phosphate amidotransferase (2ZJ3) and Lipoxygenases (3vf1) using Molecular docking tools such as pymol, discovery studio and PyX. The ligands that showed the least binding energy were 16-Pregnenolone with - 7.1 kcal/mol, Ergosterol (-6.8 kcal/mol), compared to control ligand (Metformin hydrochloride) with - 5.7 kcal/mol for antidiabetes screening and 3-(3,4-Dimethoxycinnamoyl)-4-hydroxy-6-methyl-2H-pyran-2-one (-8.3 kcal/mol), Aspidospermidin-17-ol, 1-acetyl-19,21-epoxy-15,16-dimethoxy (-7.5 kcal/mol), Ergosterol (-7.5 kcal/mol), 16-Pregnenolone (-7.4 kcal/mol), N-Acetoacetyl-deacetylcolchicine (-7.0 kcal/mol) and Squalene (-6.9 kcal/mol) compared to

Diclofenac with – 6.8 kcal/mol. These binding energies were found to be satisfactory for an efficient docking and resultant inhibition of the Glutamine:fructose-6-phosphate amidotransferase and Lipoxygenases. 3-(3,4-Dimethoxycinnamoyl)-4-hydroxy-6-methyl-2H-pyran-2-one, 16-Pregnenolone, Aspidospermidin-17-ol, 1-acetyl-19,21-epoxy-15,16-dimethoxy and Ergosterol were found to possess great prospective therapeutic properties against diabetes type 2 and inflammation and could serve as a good drug candidate for the treatment of the disorders.

Keywords: Glutamine:fructose-6-phosphate amidotransferase, Lipoxygenases, Diabetes, Inflammation, Molecular docking, phytoconstituents.

NSBMB/UPH/BIN/029

The Complete Chloroplast Genome of *Gongronema latifolium*

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ABSTRACT

Gongronema latifolium is a climbing perennial shrub with highly nutritional and medicinal qualities that grows semi-wildly in the humid region of Nigeria. The plant has reported antimicrobial, antidiabetic, antioxidant, anticancer, and anti-inflammatory properties and is used in various tradomedicinal practices across Nigeria. This study reports the first complete chloroplast genome sequence of *Gongronema latifolium* using high-throughput illumnia sequencing and assembly using the Geneious software. The chloroplast genome structure, gene order, GC content, and codon usage of the plant are similar to the typical angiosperm chloroplast genomes. This is the first chloroplast genome to be assembled from the *Gongronema* specie. The availability of a complete *Gongronema latifolium* chloroplast genome sequence is crucial to understanding its phylogenetic relationship and facilitating the genetic improvement of this popular medicinal plant.

Keywords: Chloroplast, Geneious software, *Gongronema latifolium*, Genome sequence, phylogenetic tree,

NSBMB/UPH/BIN/030

In-Vitro Antioxidant Potential and Anti-Lipase Evaluation of *Tetrapleura tetraptera* Fruit Extract Using Kinetics Model and Molecular Docking Analysis

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ABSTRACT

Obesity is a metabolic disease that is characterized by excessive fat deposition in the adipose tissues resulting from imbalance in energy metabolism and can be managed by controlling the activity of pancreatic lipase (PL). The present study investigated the in vitro antioxidant and anti-obesity potentials of *Tetrapleura tetraptera* aqueous fruit extract (TTALE) using lipase inhibition kinetics model, SwissADME prediction tool and molecular docking analysis. Preliminary evaluation of bioactive constituents and Gas chromatography-mass spectrometry (GC–MS) revealed presence of compounds such as N'-Hydroxy-3,4-dimethoxybenzene-1-carboximidamide, 5-Benzofuranacetic acid, acetamide, 4-Nitrophenanthrene, 6,7-Dimethoxy-2H-1,3-benzodioxole-5-carbonitrile and 2-Acethydrazido-5-methyl nitrobenzene. The plant extract was also found to possess moderate antioxidant capacity and inhibited pancreatic lipase via a mixed inhibition pattern as suggested by the values the inhibition constants. Molecular docking of the GC–MS identified compounds with horse PL revealed that compounds (**CPs**) **3, 5, 6, 7, 13** and **14** have high PL-binding affinity and similar binding pose with the substrate (nitrophenylbutyrate) while that of **CP-12** was similar to the standard antilipase drug used. Hydrogen bonds and van der Waals forces were predominantly involved in the ligands' interactions with some key catalytic site amino acid residues (ILE-78, ASP-79, SER-110, TRP-252, GLN-253). Also, the SwissADME prediction tool suggested high drug-likeness, bioavailability e.t.c of several compounds of the extract. In all, this study showed that the TTALE is a rich natural source of antioxidant and anti-lipase agents which could be optimized for development of new drugs against obesity.

NSBMB/UPH/BIN/031

The Complete Chloroplast Genome and Phylogenetic Analysis of *Ocimum africanum*

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ABSTRACT

Ocimum africanum is an important nutritional and medicinal plant. The plant contains antioxidants/phenolic compounds that avert impairment due to the action of reactive oxygen species (ROS). In this study, we sequenced, assembled, and annotated the complete nucleotide sequence of the chloroplast genome of an *O. africanum* species isolated in Awka, Nigeria. The chloroplast genome is 152,365 bp in length and has a conserved structure that includes the LSC (8,3367 bp) region, the SSC (17,604 bp) region, and the IR (25,697 bp) region. A total of 136 genes were identified, including 86 protein-coding genes, 37 tRNA genes, and 13 rRNA genes. While the overall GC content was 37.6%, it is 35.9%, 31.6%, and 43.1% in the LSC, SSC, and

IR regions, respectively. Phylogenetic analysis of the chloroplast genomes using FastTree showed that *O. africanum* clustered closest to the chloroplast of *O. basilicum*.

Keywords: *Ocimum africanum*, chloroplast genome, Phylogeny.

NSBMB/UPH/BIN/032

In-Silico Studies and Haematological Effects of Ethanol Leaf- Extracts of *Mucuna poggei* and *Telfairia occidentalis* on Phenylhydrazine-Induced Anaemia in Rats.

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ABSTRACT

The hepatic peptide hormone hepcidin regulates dietary iron absorption, plasma iron concentrations, and tissue iron distribution by causing the degradation of its receptor, the cellular iron exporter ferroportin. Malfunctions of the hepcidin-ferroportin axis contribute to the pathogenesis of different anemias. This study aims to carry out in-silico studies and evaluate the haematological effects of ethanol leaf-extracts of *Mucuna poggei* and *Telfairia occidentalis* on phenylhydrazine-induced anemia in rats. Fifty-four male albino rats were randomly assigned to 9 groups (n = 6); normal control (NC) rats were administered normal saline only, anaemic control (AC) rats were left without treatment, and standard control (SC) were treated with standard multivitamin, HS-12, at a dose of 0.1 ml/kg body weight. MP1, MP2, and MP3 were treated with 400, 200, and 100 mg/kg body weight of *Mucuna poggei* leaf-extract, respectively, while TO1, TO2, and TO3 were treated with 400, 200, and 100 mg/kg body weight of *Telfairia occidentalis* leaf-extract, respectively, by oral intubation for twenty-one days. Anemia was induced with phenylhydrazine intraperitoneally in all the groups except NC at a dose of 10 mg/kg body weight daily for four consecutive days. The rats were sacrificed, and blood was collected for haematological evaluation. The target protein, hepcidin, was retrieved from the protein data bank. GC-MS analysis of *Mucuna poggei* and *Telfairia occidentalis* revealed 18 and 29 active phytocompounds, respectively. Three ligands from each plant were discovered as potential inhibitors that competitively bind to the ferroportin binding site on hepcidin with high binding affinities stabilized by hydrogen and alkyl bonding interactions. PCV, RBC, HB, MCV, MCH, MCHC, and platelet levels were significantly decreased in anaemic control relative to the normal control, but significantly ($P<0.05$)

increased on treatment with the standard multivitamin and leaf-extracts of the two plants. This study demonstrates that the leaf-extracts of *Mucuna poggei* and *Telfairia occidentalis* contain phytocompounds that are potential inhibitors of the hepcidin-ferroportin axis, suggesting a useful therapeutic approach for treating anemia and an invaluable step toward the discovery of anemia chemotherapy.

Keywords: *Telfairia occidentalis*, *Mucuna poggei*, Molecular docking, hepcidin, ferroportin, haematological indices, anaemia.

NSBMB/UPH/BIN/033

Determination of Bioactive Components of Hexane, Methanol and Dichloromethane Extracts of *Cocos nucifera* Haustorium Using Gas Chromatography Mass Spectrometry (GC-MS)

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ABSTRACT

Cocos nucifera haustorium is a cotyledonic structure that forms the basal part of the embryo during *C. nucifera* germination. This structure may contain some bioactive compounds, whose determination and characterization may necessitate an alternative usage of *C. nucifera*. This present study determines the bioactive component of the hexane, methanol and dichloromethane extract of *C. nucifera* haustorium using Gas Chromatography Mass Spectrometry (GC-MS). Six viable and germinating *C. nucifera* obtained within the residential quarters of University of Port Harcourt were dissected. Their haustoria were ground, extracted and their pure extracts were separately subjected to GC-MS analysis. The predominant bioactive compounds observed in the hexane extract were Dodecanoic acid, Tetradecanoic acid, Octanoic acid and Cis-Vaccenic acid with percentage concentrations of 41.152, 17.137, 9.324 and 5.417, while 1,2-Benzenedicarboxylic acid, butyl octyl ester, Lauric anhydride, Hexadecanoic acid, 2,3-bis(acetyloxy)propyl ester and 9-Octadecenoic acid, (E)- were predominant in the methanol extracts with percentage concentrations of 22.721, 18.892, 8.996 and 7.753. 2(2-Bromoethyl)-1,3-dioxane, Bicyclo[2.2.1]heptane-2-carboxylic acid, methyl ester, 4'-(2-Acetoxyethoxy)acetophenone and Menth-1-en-9-yl angelate,p- were predominant in dichloromethane extract with percentage concentrations of 17.180, 13.283, 10.847 and 4.164 respectively. These compounds have been reported to be of pharmacological, biological and industrial importance thereby creating a more prominent relevance for *C. nucifera* haustorium.

NSBMB/UPH/BIN/034

Molecular Docking Study and Pharmacokinetic Profiling of Selected Phytochemicals with Estrogen Receptors as Anti-Breast Cancer Compounds

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ABSTRACT

A Molecular docking study and pharmacokinetic profiling were carried out on 15 selected phytochemicals with estrogen receptor PDB ID 8AOY. The Phytochemicals were found to have a strong binding affinity toward the target receptor with binding energy ranging from -6.5kcal/mol to -9.8kcal/mol. 4-methoxy coumestrol was found to have the highest binding affinity when docked with the target receptor, with a binding energy of -9.8kcal/mol. A Pharmacokinetic study carried out on the 15 phytochemicals shows that all the phytochemicals obey Lipinki's rule of 5 without single violation proving their strong degree of bioavailability. The binding affinity of 4-methoxycoumesterol was found to be higher than that of anastrozole an FDA-approved drug targeting estrogen receptors for the treatment of breast cancer. The phytochemical 4-methoxy coumestrol is subject to further study in designing a potent anti-breast cancer drug targeting estrogen receptor.

NSBMB/UPH/BIN/035

Impact of Microbes and Plants in Green Synthesis of Silver Nanoparticles (AgNPs) and its Applications: A review

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ABSTRACT

Nanotechnology is an emerging field of science that include synthesis and development of various nanomaterials, and can be defined as understanding and controlling matter at dimensions between approximately 1-100 nanometers, where unique phenomena enable novel

applications. The strategy for designing of new nanometals was developed due to their wide range of applications in many fields including medicine, agriculture, industry, environment and engineering. This review focuses on the green synthesis of silver nanoparticles using certain microorganisms and plant extract as well as its applications. Because of the adverse effects posed by both chemical and physical methods in synthesizing AgNPs. Biogenic approach uses environmentally friendly reagents as reducing and capping agents thereby decreasing the risk of releasing toxic residues into the environment. The development of reliable and eco-friendly methods for the synthesis of silver nanoparticles is vital in the study of nanotechnology. They are very important because of the unique properties (biological, chemical and physical) which enable it to have a wide number of applications. Among several nanoparticles, silver nanoparticles have received more attention due to its effectiveness as antimicrobial agent which contains low toxicity. Biological synthesis of AgNPs is a great approach to diminishing the utilization of substances that are perilous to human wellbeing and to the earth at large.

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Molecular Identification of Amylase-Producing Bacteria at a Cassava Production Site

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ABSTRACT

Amylases which are essential enzymes responsible for the breakdown of starch into glucose serve pivotal functions across various industrial sectors, such as the food and pharmaceutical industries. This study focused on identifying amylase-producing bacteria from a soil sample collected at a cassava production site. To identify potential amylase producers, serial dilutions of the soil sample were cultured on starch media. Nutrient agar was used as a bacterial growth medium and incubation was carried out at 37°C. The microbial isolates with amylase-producing potential were distinguished by the formation of a clear zone around their colonies when exposed to a 1% iodine solution. Enzyme activity assays were performed using the dinitrosalicylic acid (DNSA) reagent method. Five bacteria isolates designated as B1-B5 were obtained, all exhibiting amylase-producing potential. The DNA of the isolates were extracted and amplified by PCR (Polymerase Chain reaction) using the universal bacteria primers (27F and 1942R), and the samples were then sequenced. Molecular identification of the two best-performing colonies revealed the isolates to be *Bacillus thuringiensis* and *Staphylococcus saprophyticus* with 98 % and 99 % nucleotide sequence similarity respectively. The results of this study provide insight into potential sources of amylases which could be exploited for industrial purposes.

Keywords: Amylases, Industrial enzymes, Bacteria, Soil

NSBMB/UPH/BIN/037

Exploring Machine Learning Models for Malaria Diagnosis in Nigeria: A Preliminary Study

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ABSTRACT

Malaria is a major public health problem, especially in developing countries and sub-Saharan Africa, where majority of malaria cases and deaths occur. Rapid and accurate diagnosis of malaria is important for the effective control and treatment of the disease. This research is a preliminary study aimed to develop a machine learning model that can accurately diagnose malaria in rural communities in Nigeria, based on patients' symptoms and other clinical information, using low-cost and readily available diagnostic tools. The model was trained on a 2020 Demographic and Health Surveys (DHS) Program Geospatial Covariate datasets containing clinical information of patients in Nigeria. Advanced algorithms were used to identify patterns and predict the likelihood of malaria infection. Residual analysis of the error terms of the model showed a normal distribution. The closeness of the predicted malaria incidence scores and the experimental scores indicates the robustness of the ML model. The coefficient of determination (r^2) scores of Random Forest Regressor (RFR), Multiple Linear Regression (MLR), and Ridge models are 0.9937, 0.9916, and 0.9924 respectively for the test set. This demonstrates the competence of the models' prediction abilities. The RFR model's learning curve results showed a recurring pattern. The model's performance on the test dataset consistently improved as the volume of data increased. The accuracy and efficiency of malaria diagnosis can be significantly improved, by developing machine learning model for diagnosing malaria in rural communities, thereby resulting in earlier detection and treatment of the disease, hence reducing morbidity and mortality rates among affected populations.

Keywords: learning curve, machine learning, malaria, Nigeria, residual analysis,

NSBMB/UPH/BIN/038

Identification of Potentially Selective *Schistosoma mansoni* Cathepsin B Inhibitors from ChEBI and Drugbank Databases using Molecular Docking Approach

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ABSTRACT

Schistosomiasis is a debilitating neglected tropical disease caused by the parasitic blood fluke belonging to the genus *Schistosoma*. Three species; *S. mansoni*, *S. haematobium* and *S. japonicum* are the most transmitted in humans. Currently, transmission in 78 countries among tropics and sub-tropics have been reported (WHO, 2023). Despite the considerable efforts in the past, the unavailability of vaccine for the prevention of schistosomiasis hinders the progress of its elimination. The treatment of the disease relies upon chemotherapy using praziquantel for over 40 years. Because of the risk of drug resistance, there is need to emphasize on searching for novel anti-schistosomal chemotherapy. *S. mansoni* cathepsin B (SmCB) is the most abundant cysteine proteinase used by the parasite to degrade host hemoglobin in order to obtain nutrients (Sajid *et al.*, 2003). Jilkova *et al.*, (2011) demonstrated that inhibition of the SmCB1 by vinyl sulfones (K11017 and K11777) is associated with phenotypic changes observed in the parasite culture. Crystal structures of SmCB1 (https://www.rcsb.org/structure/3qsd) and human cathepsin B (http://www.rcsb.org/structure/3AI8) were retrieved from protein databank and prepared for molecular docking. A total of 274 compounds were retrieved in SDF format from DrugBank and ChEBI databases based on K11017 and K11777 structures. The compounds were imported into PyRx virtual screening and docked against both enzymes in order to obtain parasite-specific inhibitor(s). Out of the 274 compounds, 24 were estimated to have the highest binding affinity towards SmCB1 in the range of -7.3 to -6.0 Kcal/mol. Furthermore, the compounds (such as Sivelestat, Elinogrel, Parecoxib, Mibampator, and Resminostat) were predicted to have fairly good pharmacokinetic parameters and passed the Lipinski's rule of five. These compounds could serve as possible leads to design new anti-schistosomal drugs.

Keywords: Schistosomiasis, Molecular Docking, *Schistosoma mansoni* Cathepsin B1, DrugBank, CheBI

NSBMB/UPH/BIN/039

N-Hexane Leaf Fraction of *Cnidoscolus aconitifolius* Attenuates Benign Prostrate Hyperplasia: An *In-Silico* Study

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ABSTRACT

The potentials of n-hexane leaf fraction of *Cnidoscolus aconitifolius* to attenuate benign prostate hyperplasia (BPH) was carried out. The leaf was prepared using standard operation procedure. Gas Chromatography – Mass Spectroscopy (GCMS) assay was carried out on the n-hexane fraction of the leaf extract. Molecular docking analysis was carried out on the identified bioactive components using PyRx, Chimera and Discovery Studio computer softwares. The structure and properties of the bioactive compounds, finasteride (standard anti-BPH drug) and 5α-reductase were downloaded from appropriate databases. The result obtained revealed 20 bioactive compounds present in the n-hexane leaf fraction. There were interactions of these bioactive compounds with 5α-reductase. Some of these compounds such as 9-Octadecanoic acid, Oleic acid and Ethyl-9-hexadecenoate exhibited - 6.1, - 6.1, and -6.2 kcal/mol binding affinity respectively for the active site of 5α-reductase. These compounds showed anti-BPH comparable with the anti-BPH action of finasteride, a standard BPH drug. The 2D structure models showed the interactions of these compounds with the amino acids present at the binding pocket of the enzyme. The properties, interactions and activities of these bioactive compounds indicate that the n-hexane leaf fraction of *Cnidoscolus aconitifolius* may have an anti-BPH effect and may be recommended for further scientific study as it may be a promising anti-BPH agent.

Keywords: *Cnidoscolus aconitifolius*, benign prostate hyperplasia, 5α-reductase, Gas Chromatography – Mass Spectroscopy (GCMS), finasteride

NSBMB/UPH/BIN/040

Pterin-6-Carboxylate Acid a Novel Inhibitor of 5JKW. Related to Breast Cancer a Computational Dynamics and a Validation Study

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ABSTRACT

Breast cancer has become the most common type of tumor identified worldwide, as well as the leading cause of cancer-related death among women. Aromatase inhibition is important in lowering the growth-stimulatory effects of estrogen in estrogen-dependent breast cancer. This study was set up to investigate the inhibitory potential of pterin-6-carboxylic acid on Aromatase enzyme using the Molecular Dynamics simulation approach. The human aromatase 3D

coordinate used in this study is derived from the crystal structure of human placental aromatase cytochrome P450 in complex with testosterone (PBD ID: 5JKW) template using MODELER ver. 9.15. This unliganded protein is referred to as Apo-Aromatase. Pterin-6-carboxylic acid (PubChem CID: 135403803), 2D structure were retrieved from PubChem and docked (Autodock-Vina inbuilt in PyMol) into the active site of human placental aromatase cytochrome P450 using the coordinates of the co-crystallized testosterone as reference. A 1000ns MD simulation was done to generate a comparative study between the inhibitory potentials of testosterone and pterin-6-carboxylic acid on aromatase. Ligand-dependent salt-bridge dynamics, dynamic cross-correlation matrix, and binding energies calculation of ligands were investigated. Apo state aromatase was also used to validate the study. The ligand-dependent salt-bridge dynamics of Glu469-Arg403 showed a significant difference between the distance of the salt bridge of apo state aromatase and the salt bridge distance of aromatase in complex with testosterone and pterin-6-carboxylic acid. DCCM revealed non-correlated motion throughout the three complexes. Ligand binding energy, including van der Waals, electrostatic, polar solvation, SASA, and binding parameters contributing to ligand stability to target binding sites, was probed. Binding energies between testosterone and pterin-6-carboxylic acid complex with aromatase indicate that testosterone bound to aromatase is more stable in the binding site of the enzyme compared to pterin-6-carboxylic acid bound to aromatase. This study hypothesized that pterin-6-carboxylic acid binds complementarily to the pocket of aromatase, indicating an inhibition of the enzyme and likely inhibiting breast cancer progression.

Keywords: Aromatase, pterin-6-carboxylic acid, pterin-6-carboxylic acid and SASA

NSBMB/UPH/BIN/041

Drugging the undruggable: Bioactive Compounds from *Caesalpinia bonduc* as Prostate Cancer Drug Candidates Against Mutant SPOP and AR-V7 *In Silico*

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ABSTRACT

Introduction: Prostate cancer (PCa) is a prevalent and aggressive malignancy with challenges arising from mutations in key genes such as SPOP and AR. The current state of research has not adequately addressed the issue of drug resistance that results in Castration Resistant PCa.
Objective: Our study represents a groundbreaking approach to addressing the challenge of drug resistance in prostate cancer. This research is driven by the ambition to target mutant SPOP and AR-V7, which are major contributors to drug resistance in prostate cancer, using bioactive compounds from *Caesalpinia bonduc*. **Materials and methods:** Pure compounds were isolated from *Caesalpinia bonduc* leaves using a sequential process of high-performance liquid chromatography (HPLC), nuclear magnetic resonance (NMR), and mass spectrometry (MS) for structural identification and confirmation. Computational methods were employed to assess the inhibitory and cytotoxic potential of the isolated compounds against SPOP and AR-V7.
Results: The different pure compounds of *Caesalpinia bonduc* leaves obtained were subjected to virtual screening and molecular docking, including 4,4'-dihydroxy-2'-methoxy-chalcone, 7,4'-dihydroxy-3,11-dehydrohomoisoflavanone, 5,7,3',4'-tetrahydroxy-flavone (Luteolin), and 7,3',4'-tetrahydroxy-3-methoxyflavone (quercetin-3-methyl ether) designated as TCB 9, 11, 15, and 16. These compounds exhibited strong binding affinities to mutated SPOP and AR-V7. Notably, TCB15 and TCB11 showed stronger binding affinities to mutated SPOP compared to the reference compound Enzalutamide, while TCB11, TCB15, and TCB16 demonstrated stronger binding affinities to AR-V7 compared to the reference compound Apalutamide. These findings suggest the potential of these compounds to disrupt aberrant functions of Mutated SPOP and AR-V7. **Conclusion:** The study highlights the potential of bioactive compounds derived from *Caesalpinia bonduc* leaves, particularly TCB15 and TCB11, as promising drug candidates for the treatment of prostate cancer. Further in vivo studies are essential to validate the efficacy and safety of these compounds. This research contributes valuable insights into potential therapies for targeting Mutated SPOP and AR-V7, thereby providing lead to combating the castration resistant PCa.

Keywords: Androgen receptor – variant 7, Androgen deprivation therapy, *Caesalpinia bonduc,* SPOP, Prostate cancer, targeted therapy

SUB-THEME 9

ENTREPRENEURSHIP AND INNOVATION IN BIOCHEMISTRY AND MOLECULAR BIOLOGY

NSBMB/UPH/EIN/001

Ict Adoption On Small And Mediun Enterprises In Nigeria: A Review

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ABSTRACT

The paper work is a literature base work that focuses on the use of secondary sources. The research reviewed related work of other scientific and literature base authors and came up with opinions in ICT adoption in SMEs. The paper work focused on the needs of ICT adoption in SMEs in Nigeria highlighted the impact of ICT adoption in SMEs and the challenges SMEs confronted in the adoption and usage of ICT. Such impact as mentioned in this paper work were increased in business performance, business growth, business expansion, efficiency, effectiveness, competitiveness and amongst other. The paper also pointed out the challenges confronted by SMEs in the usage of ICT as cost implication, lack of adequate infrastructure, government unsupportive attitude, unavailability of skilled personnel, lack of adequate capital etc. Also highlighted is the bridging of the gap between SMEs in urban and rural areas in Nigeria through ICT adoption and its social implication in Nigeria. The paper made suggestions on the ways forward to curb the challenges such as: Government and stakeholders should make available ICT infrastructure in urban and rural areas to give room to SMEs to adopt the use of ICT. Network and internet service providers should reduce their charges and bills, and boost their bandwidth to enhance better internet services to encourage ICT adoption in SMEs in Nigeria etc.

Key words: Information and Communication Technology (ICT), Adoption, Small and Medium Enterprise (SMEs), Competitiveness, Efficiency.

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Minimum Sample Size	1 µl
Path Length	0.05 ~ 1.2 mm (Auto-ranging)

Cuvette Specification	
Beam Height	8.5 mm
Absorbance Range	0.002 ~ 2.2 Abs
Measurement Time	3 Sec

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