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Antiaflatoxigenic Activities of Some Plant Aqueous Extracts Against Aflatoxin-B1 Induced Renal and Cardiac Damage

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The present investigation aims at assessing the antiaflatoxigenic effect of aqueous extracts of some traditional medicinal plants (namely, *Zingiber officinale* Roscoe rhizome, *Cinnamomum zeylanicum* bark, *Trigonella foenum graecum* seeds, *Camellia sinensis* leaves and *Salvia officinalis* leaves) compared to the anticancer drug, methotrexate (MTX) against aflatoxin-B1 (AFB1) induced renal and cardiac damage in rats. The results revealed that administration of AFB1 induces oxidative stress in kidneys of AFB1-treated rats through elevating the level of malondialdehyde (MDA) and depleting the levels of tissue antioxidants, glutathione reductase (GR), glucose-6-phosphate dehydrogenase (G-6-PDH) and vitamin C. The results also showed that aflatoxicosis interfere with the cellular energy supply of rat hearts through its inhibitory action on some markers of energy metabolism indicated by a decrease in glucose and glycogen contents of heart and a reduction in the activities of some glycolytic enzymes, phosphogluco-isomerase (PGI), glyceraldehyde-3-phosphate dehydrogenase (GAPDH) and lactate dehydrogenase (LDH) compared to normal healthy animals. Supplementation of the aqueous extracts of the above mentioned plants, effectively ameliorated the deviation induced in both kidneys and hearts of animals in response to AFB1 administration. This effect was evident through reducing MDA level and releasing the inhibitory effect of AFB1 on the levels of antioxidants in kidneys as well as on the energetic biomarkers in hearts. However, administration of MTX to AFB1-treated rats dramatically amplified the toxic effect of aflatoxicosis induced in both kidneys and hearts, indicated by marked increment in MDA level and decrease in the levels of antioxidants in kidneys of AFB1- MTX group in relation to AFB1-group, also a marked decrease in the bioenergetic markers in hearts of AFB1- MTX treated animals versus AFB1-treated ones was documented. From the current investigation, it can be concluded that supplementation of the extracts of the different plants presented in this study was beneficial in modulating the alterations induced in kidneys and hearts of rats under the effect of AFB1. (*Journal of Pharmacology and Toxicology 4 (1): 1-16, 2009;* ***doi:*** *10.3923/jpt.2009.1.16*)

Anti-Nociceptive Effects of an Ethanolic Extract of the Whole Plant of *Synedrella nodiflora* (L.) Gaertn in Mice: Involvement of Adenosinergic Mechanisms

E. Woode, P. Amoateng, C. Ansah and M. Duwiejua

This study presents the effect of an ethanolic extract of the whole plant of *Synedrella nodiflora*, a plant used in Ghana for the treatment of epilepsy and pain, in formalin-induced pain and acetic acid-induced writhing assay and the possible mode(s) of action of its analgesic action. For comparison, morphine and diclofenac were used as standard opioid and NSAID respectively. The ethanolic extract (100-1000 mg kg^{-1}; p.o.) and morphine (1-10 mg kg^{-1}; i.p.) dose-dependently decreased both phases of the formalin-induced nociceptive behavior. The antinociceptive effect of *S. nodiflora* (300 mg kg^{-1} p.o.) on the first and second phases of formalin induced pain was significantly blocked by caffeine but not by naloxone. In the acetic acid-induced writhing test, diclofenac and *S. nodiflora* significantly reduced the number of writhes dose dependently. Also, the effect of *S. nodiflora* (300 mg kg^{-1} p.o.) was blocked by caffeine (3 mg kg^{-1} i.p.) but the analgesic effect of diclofenac was enhanced significantly. The observed effects of caffeine on the central and peripheral analgesic effects of *S. nodiflora* in the formalin and acetic acid induced writhing suggest the possible involvement of adenosinergic mechanism(s). (*Journal of Pharmacology and Toxicology 4 (1): 17-29, 2009;* ***doi:*** *10.3923/jpt.2009.17.29*)

Immunotherapy of 347 Volunteer Outpatient Morphine Addicts by Human Therapeutic Morphine Vaccine in Kermanshah Province of Iran

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The effective constituent of human therapeutic morphine vaccine is morphine-6-succinate-BSA which would be produced by mixed anhydride method. By injection of 3 doses of vaccine at the interval of 0-30-60 days, humoral immunity would be caused in addicts. In this study 347 morphine addicted volunteers were vaccinated with therapeutic morphine vaccine according to WHO and national vaccination protocol. The variables were doses of vaccine, concentration of anti-morphine antibody, total protein and gamaglobuline. Volunteers were bled and then injected at the interval of 0-30-60 days. All subjects were bled at day 90 and after 1 year, 10% of them were bled randomly. Total protein and gamaglobuline

were determined by serum electrophoresis and anti-morphine antibody level was estimated by ELISA. Considered variables were directly correlated with number of injections that were detected on 30 days after the first injection reaching their peak by three months after first injections and were not declined to the baseline by 1 year. All subjects were followed up and monitored for 1 year. The vaccine was well tolerated by addicted volunteers and had no serious drug-related adverse events. Only 1% at the first dose experienced brief post injection twitching and all subjects were immunized. *(Journal of Pharmacology and Toxicology 4 (1): 30-35, 2009; **doi:** 10.3923/jpt.2009.30.35)*

Selective Digestive Decontamination can be an Infection-Prevention Regimen for the Intoxicated Patients

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Selective Digestive Decontamination (SDD) the risk factors for the respiratory tract of the intoxicated patients receiving have never been investigated. Thirty intoxicated patients who were admitted to the intensive care unit are included in this study. The three different methods of SDD were randomly studied: SDD, SDD with systemic Antibiotic Therapy (AT) and only systemic AT were applied to groups of ten patients each. On admission, samples were taken from the oropharynx and trachea before the first administration of SDD and then every three days. In cultures, Gram-negative bacilli (*Pseudomonas aeruginosa*, *Klebsiella pneumoniae*) and Gram-positive cocci (*Staphylococcus aureus*) colonizations were significantly higher in Group SDD+AT and Group AT than Group SDD ($p<0.005$, $p<0.05$). The pulmonary infection and pulmonary consolidation on chest X-rays were significantly more visible in Group SDD+AT and Group AT ($p<0.05$). As a conclusion, SDD is an effective method to prevent intoxicated patients from respiratory system infection. Moreover, SDD can be an infection-prevention regimen in a biological event. *(Journal of Pharmacology and Toxicology 4 (1): 36-40, 2009; **doi:** 10.3923/jpt.2009.36.40)*

Anti-Microbial Activities of *Millingtonia hortensis* Linn. Flowers Essential Oil

Chaiyasit Sittiwet

Millingtonia hortensis Linn. flowers have been extracted for essential oil using vapor distillation with 0.5-2% yield. The essential oil of *M. hortensis* Linn. was tested against various species of bacteria. The agar diffusion susceptibility test

showed an inhibitory effect on 6 out of 10 tested strains. The growth of 4 of gram-positive bacteria (*S. aureus* ATCC 25923, *S. epidermidis* ATCC12228, *B. subtilis* ATCC6633 and *L. plantarum* ATCC14917) and 2 of gram negative bacteria (*E. coli* ATCC25922 and *P. vulgaris* ATCC13315) were inhibited by *M. hortensis* Linn. flower essential oil. The MICs (minimal inhibitory concentration) of *M. hortensis* Linn. flower essential oil are 0.5-2 and 1-4 ml L^{-1}, respectively. In this study *M. hortensis* Linn. flower essential oil showed broad spectrum for the anti-microbial activity at low concentration. (*Journal of Pharmacology and Toxicology 4 (1): 41-44, 2009;* ***doi:*** *10.3923/jpt.2009.41.44*)

Glycemic Control and Therapeutic Effect of *Nigella sativa* and *Curcuma longa* on Rats with Streptozotocin-induced Diabetic Hepatopathy

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This study investigated the possible antidiabetic role and therapeutic crucial action of two medicinal plants namely *Curcuma longa* L. (Zingiberaceae) rhizome and *Nigella sativa* L. (Ranunculaceae) seeds compared to the currently available antidiabetic drug gliclazide (diamicron) against diabetic complication induced liver injury in rats. Experimental diabetes was induced by a single-dose (40 mg kg^{-1}, intraperitoneally, i.p.) streptozotocin (STZ)-injection and the two studied plants were administered orally (300 mg kg^{-1} b.wt. either each alone or in their synergistic combination) for 30 days commenced 2 weeks after induction of diabetes. The following parameters were measured: blood glucose (marker of hyperglycemia), blood fructosamine, hemoglobin (Hb) and albumin (indices of diabetic protein glycation), hepatic glycolytic enzymes, hexokinase (HK), pyruvate kinase (PK) and lactate dehdrogenase (LDH) as well as hepatic gluconeogenic enzyme, phophoenolpyruvate carboxykinase (PEPCK) (to assess the mechanism (s) of hypoglycemic action of the used plants), hepatic oxidative stress markers, Nitric Oxide (NO) and malondialdehyde (MDA, marker of lipid peroxidation), hepatic antioxidant markers including superoxide dismutase (SOD), catalase (CAT), glutathione reductase (GR) and reduced glutathione (GSH). Blood alanine aminotransferase (ALT) and aspartate aminotransferase (AST) were also measured as markers of liver function. The results revealed that induction of diabetes induces metabolic disorder and oxidative hepatopathy indicated by the deviation in the above markers in both blood and livers of diabetic rats. Oral administration of either *C. longa* rhizome or *N. sativa* seeds or their synergistic combination successfully modulated the diabetic increase in blood glucose and

fructosamine to their normal levels as well as the consequence diabetic decrease in the Hb and albumin levels, indicating their potential antidiabetic and antiglycating abilities. The plants also effectively have beneficial action in up-regulating of hepatic glycolytic enzymes and down regulating the gluconeogenic enzyme which have the major role in diabetic hyperglycemia and this may demonstrate the mechanisms of glycemic control of these plants. Furthermore, ingestion of the current plants effectively modulated hepatic oxidative tissue damage indicated by amelioration of the deterioration occurred in oxidative stress and antioxidants markers in hepatic of diabetic animals and ensured by normalization of liver function blood enzymes activities, confirming their potential antioxidant activity. Supplementation of diabetic animals with gliclazide modulated diabetic induced alteration in most of the above studied markers. These results suggest that either *C. longa* rhizome or *N. sativa* seeds or their synergistic combination have multi-beneficial actions in controlling diabetes and consequence complication induced in liver and may candidate as natural antidiabetic drugs. (*Journal of Pharmacology and Toxicology 4 (2): 45-57, 2009;* ***doi:*** *10.3923/jpt.2009.45.57*)

Dibutylnitrosamine Induces Histopathological Changes in Rat: Possible Protective Effects of Cinnamon Flavonoid Extract

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The aim of this study was to investigate the protective role of Cinnamon Flavonoid Extract (CFE) against histopathological changes in albino rats of Wistar strain treated with Dibutylnitrosamine (DBNA) for 12 weeks. The results indicated that rats treated with DBNA recorded decreasing in the total body and liver weights and increasing in spleen and kidney weights with significant values when compared with the control group all over the experiment period 4, 8 and 12 weeks. Addition of CFE by 150 and 300 mg kg^{-1} b.wt./day in the presence of nitrosamine induced significant improvements in all organs weights. Also, DBNA treated group had histopathological changes on liver through degeneration hyperemia, inflammatory reaction, kidney through hemorrhages renal casts hyperemia, inflammatory reaction and also urinary bladder through papillary hyperplasia with papillary projection formation in the cell layer of the lining epithelium. The co-treatment of CFE with DBNA leads to prevent some of the previous histopathological changes mainly on liver and urinary bladder and secondary on the kidney. It could be concluded that CFE was effective in protecting against DBNA-induced histopathological changes. These results supported present hypothesis that CFE contains several compounds that are able to prevent or inhibit DBNA toxicity. (*Journal of Pharmacology and Toxicology 4 (2): 58-69, 2009;* ***doi:*** *10.3923/jpt.2009.58.69*)

Assessment of Tonica, an Aqueous Herbal Haematinic, in the Modulation of Rat Hepatic Microsomal CYP-Mediated Drug Metabolizing Enzymes: Implications for Drug Interactions

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The effects of Tonica (TN), an herbal haematinic prepared from the stem barks of *Khaya senegalensis*, *Mitragyna stipulosa* and *Kigelia africana*, on the activities of hepatic microsomal cytochrome P450 (CYP) enzymes were investigated in Sprague-Dawley rats. TN was administered to rats, by oral gavage, at the normal human dose (28 mg/kg/day), 10x and 20x that dose for 6 weeks. Activities of certain hepatic CYP drug-metabolizing enzymes and pentobarbital-induced sleeping time were determined in control and TN-treated animals. There were insignificant ($p>0.05$) increases in the microsomal protein content (3.25-31%) at all doses of TN in a non-dose-dependent fashion. However, there was a general insignificant attenuation of NADPH cytochrome c (P_{450}) reductase activity in TN-treated animals compared to control (8.9-26.1%). p-Nitrophenol hydroxylase (pNPH) activity was insignificantly ($p>0.05$) elevated (14.8-23%) in the TN-treated rats compared to control. The activities of aminopyrine-N-demethylase (AmD) and nitroanisole-O-demethylase (NOD) at the normal and 10x the normal dose of TN were not significantly different from controls, but at 20x the normal dose these enzyme activities were insignificantly ($p>0.05$) elevated above controls (11.7 and 39.8% for AmD and NOD, respectively). Pentobarbital-induced sleeping time in TN pre-treated animals were insignificantly ($p>0.05$) inhibited compared to control (3.7-9.5%). These results suggest that TN by insignificantly elevating certain CYP isozymes may have the potential of modulating the metabolism of substances other than pentobarbital. (*Journal of Pharmacology and Toxicology 4 (2): 70-78, 2009*; ***doi:*** *10.3923/jpt.2009.70.78*)

CNS Activity of Methanol and Acetone Extracts of *Acorus calamus* Leaves in Mice

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The present study was designed to evaluate CNS depression or analeptic activity of acute oral administration of methanol (ACME) and acetone (ACAE) extracts of *Acorus calamus* leaves in mice. Spontaneous locomotor activity, immobility time using forced swim test, diazepam-induced sleeping time and motor impairment assessment using rotarod were used to assess CNS

depression/analeptic activity of ACME and ACAE in mice. The extracts ACME (5, 20 and 50 mg kg^{-1}, p.o.) and ACAE (20 and 50 mg kg^{-1}, p.o.) significantly decreased the spontaneous locomotor activity in dose dependent manner. The acute treatment of ACME and ACAE (5, 20 and 50 mg kg^{-1}, p.o.) significantly increased the immobility time and decreased the swimming behavior. Administration [6 h prior] of ACME (50 mg kg^{-1}, p.o.) and ACAE (20 and 50 mg kg^{-1}, p.o.) significantly potentiated the diazepam (25 mg kg^{-1}, i.p.)-induced sleeping time in mice. These extracts did not induce disturbance in motor coordination. The results of the present research provided evidences that ACME and ACAE may contain psychoactive substances that are CNS depressant in nature. The CNS depression property of these extracts can be utilized for further anticonvulsant research. (*Journal of Pharmacology and Toxicology 4 (2): 79-86, 2009;* ***doi:*** *10.3923/jpt.2009.79.86*)

In vitro Antimicrobial Activity of *Pluchea indica* Aqueous Extract: The Potential for Urinary Tract Infection Treatment

Chaiyasit Sittiwet

The *P. indica* aqueous extract was tested against both gram positive bacteria (*S. aureus* ATCC 25923, *S. epidermidis* ATCC 12228, *M. luteus* ATCC 9341, *B. subtillis* ATCC 6633 and *L. plantarum* ATCC 14917) and gram negative (*E. coli* ATCC25922, *S. typhimurium* ATCC 14028, *K. pneumonia* ATCC 10031, *P. vulgaris* ATCC 13315, *Ps. aeruginosa* ATCC 9721) using agar diffusion susceptibility test. The result showed zone of inhibition against *E. coli* and *K. pneumoniae*. The Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) are between 1-2 and 4-8 mg L^{-1} respectively. This result show the possibility of using *P. indica* as an alternative therapy in the treatment of urinary tract infections. (*Journal of Pharmacology and Toxicology 4 (2): 87-90, 2009;* ***doi:*** *10.3923/jpt.2009.87.90)*

Anxiogenic-like Effects of a Root Extract of *Sphenocentrum jollyanum* Pierre in Murine Behavioural Models

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This study has characterized the effect of an ethanolic extract of roots of *Sphenocentrum jollyanum* (SJE) which are chewed or taken in alcoholic bitters

in Ghana for its stimulant effect on the CNS and as an aphrodisiac agent. Four widely used animal models of anxiety: the open field test, elevated plus maze, hole-board and light/dark box were employed. Results were compared qualitatively to those obtained for diazepam and caffeine which served as anxiolytic and anxiogenic drugs, respectively. Acute administration of SJE (100-1000 mg kg^{-1}, p.o.) exhibited anxiety-like effects dose-dependently, which were qualitatively similar to those induced by caffeine (10-100 mg kg^{-1}). Both drugs decreased the number of entries and time spent on the open arms of the elevated-plus maze and increased the number of visits to the corners of the open field. In addition, SJE decreased the number and duration of head dips compared to vehicle-treated mice. Also, the extract exhibited anxiogenic properties in hole-board and light/dark box by significantly decreasing the number of head-dips and the time spent in the dark portion of the light/dark box, respectively. In contrast, diazepam (0.1-1 mg kg^{-1}) exhibited a typical profile of an anxiolytic drug. At all doses tested, SJE produced no motor deficits in animals using the rotarod test but decreased spontaneous locomotor activity in the activity cage apparatus. In conclusion, the results indicate that the root extract of *S. jollyanum* has anxiogenic like effects in mice and thus supports the use of the plant in traditional medicine. (*Journal of Pharmacology and Toxicology 4 (3): 91-106, 2009;* ***doi:*** *10.3923/jpt.2009.91.106*)

Nephrotoxicity Reduction by Ceftriaxone plus Vancomycin (Vancoplus) Reconstituted with VRP 1020 in Blood *of Mus musculus* Mice

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The aim of the present study was to evaluated the effect of the VRP 1020 in reconstitution with fixed dose combination of ceftriaxone-vancomycin (Vancoplus). The mice were fed standard pelleted diet and water *ad libitum*. The test room was air conditioned with temperature 23±20°C, humidity 65±5% and with artificial fluorescent light (10-14 h) of light and dark, respectively. Thirty *Mus musculus* mice (weighing 30±5 g) were divided into 5 groups containing 6 mice in each group. Group I: control (normal saline), group II: ceftriaxone (28.57 mg kg^{-1} body weight/day) group III: vancomycin (14.2 mg kg^{1-} body weight/day), group IV: ceftriaxone-vancomycin (42.8 mg kg^{-1} body weight/day) and group V: ceftriaxone-vancomycin+VRP 1020 (42.8 mg kg^{-1} body weight/day). Present finding showed that activities of antioxidant enzymes (superoxide dismutase and catalase) and pyridoxal-5-phosphate level (biologically most active co-enzyme of

vitamin B_6) were significantly increased along with decreased in lipid peroxidation (malonaldialdehyde) level in vancoplus treated group as compared to ceftriaxone and vancomycin alone and combination of ceftriaxone-vancomycin treated group. Similarly, the levels of extracellular antioxidant (creatinine and uric acid) were found to be significant lowered in vancoplus treated group when compared to ceftriaxone, vancomycin and ceftriaxone-vancomycin treated group. These results indicated that reconstitution of VRP 1020 with fixed dose combination of ceftriaxone-vancomycin protects against ceftriaxone and vancomycin induced nephrotoxicity that improved the activities of free radical scavenging enzymes. (*Journal of Pharmacology and Toxicology 4 (3): 107-116, 2009*; ***doi:*** *10.3923/jpt.2009.107.116*)

Anti-Diarrhoeal Activity of *Blighia sapida* (Sapindaceae) in Rats and Mice

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The anti-diarrhoeal activity of the ethanolic and aqueous extracts of *Blighia sapida* (Sapindaceae) stem bark on castor oil-induced diarrhoea and enteropooling and gastrointestinal motility in rats and mice were investigated. Doses of the ethanolic and aqueous extracts of *B. sapida* (265, 530 and 1060 mg kg^{-1} body weight) or loperamide (3 mg kg^{-1}) were administered (p.o.) to rats and mice 4 h before castor oil challenge and the numbers of diarrheoal defaecations or weight of feacal matter in intestines noted. In another study, animals were administered with charcoal meal or tragacanth and similar doses of extracts (p.o.) or 0.1 mg kg^{-1} atropine (i.p.) or tragacanth administered immediately thereafter and the distance moved by the charcoal meal from the pylorus measured. The results indicate that both extracts of *B. sapida* caused significant ($p<0.001$) dose-dependent inhibitions of the castor oil-induced diarrhoea (39.7-93.2%) and intestinal motility (31.9-77.5%) with the highest dose (1060 mg kg^{-1}) showing inhibitions (70.4-93.2%) comparable to loperamide (89-100%) and atropine (72.8-100%), respectively. However, castor oil-induced enteropooling was significantly ($p<0.05$) inhibited by the ethanolic and aqueous extracts in rats (23.8-25.9 %) and mice (58.4-59.0%) at the highest dose compared to 41.6-46.8% for loperamide. These results indicate that there were no significant differences between the ethanolic and aqueous extracts of *B. sapida* in the reduction or prevention of castor oil-induced diarrhoea and that *B. sapida* may act through the inhibitions of intestinal motility and enteropooling. (*Journal of Pharmacology and Toxicology 4 (3): 117-125, 2009*; ***doi:*** *10.3923/jpt.2009.117.125*)

Effects of Mercury Exposure on Blood Chemistry and Liver Histopathology of Male Rats

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The present investigation aimed at evaluating blood chemistry and histological changes in liver of male rats exposed to mercury (20 ppm) in their drinking water for 8 weeks. Body weight was recorded at weekly interval during the exposure period and after 8 weeks, blood was collected for serum analysis and thereafter the animals were sacrificed by cervical dislocation and their liver was collected for histopathological studies. For light microscopy the liver tissue was stained with haematoxylin and eosin. The body weight gain in the mercury exposed animals lagged behind the controls. Almost all blood parameters analyzed in the present study were altered significantly in the mercury exposed animals as compared to the control. The liver tissue was conspicuously damaged and degenerative and necrotic changes were observed in almost every areas of the mercury exposed liver tissue. The blood parameters studied herein may serve as potential serum enzyme biomarkers for mercury-induced hepatotoxicosis which ultimately affects the general health of the animals by inducing alterations in the integrity of the vital organ liver. (*Journal of Pharmacology and Toxicology 4 (3): 126-131, 2009*; ***doi:*** *10.3923/jpt.2009.126.131*)

In vitro Evaluation of Lozenges Containing Extracts of Roots of *Zapoteca portoricensis* (FAM: Fabaceae)

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The aim of this research was to formulate *Zapoteca portoricensis* root extract as Lozenges and to evaluate some of their antimicrobial and tablet properties. The root extracts were formulated into Lozenges using either Sodium Carboxy Methyl Cellulose (SCMC) or Carboxy Methyl Cellulose (CMC) as binders. Uniformity of weight, crushing strength, microbial sensitivity and pre-extinction time studies (using *E. coli*, *S. aureus* and *Candida albicans*) were conducted on three Lozenges formulated with either SCMC (Batch A), CMC (Batch B) and a reference standard, Dequadin^{R}, containing dequalinium hydrochloride (Batch C). Results showed that Batches B and C passed the weight uniformity test. The three batches had mean crushing strengths of 4.86±0.043, 3.9±0.03 and 13.1±0.43 KgF, respectively for A, B and C. *S. aureus* and *Candida albicans* were sensitive to the test lozenges whereas *Escherichia coli* was not. *Candida*

albicans was minimally sensitive to the standard lozenge, while *S. aureus* was not. Both the test and the standard samples showed extinction times greater than 30 min. (*Journal of Pharmacology and Toxicology 4 (3): 132-137, 2009*; ***doi:*** *10.3923/jpt.2009.132.137*)

An Evaluation of the Anti-inflammatory, Antipyretic and Antinociceptive Effects of Ficus exasperata (Vahl) Leaf Extract

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The hydro alcoholic leaf extract of Ficus exasperata (Vahl) (family Moraceae) (FEE) was evaluated for its antinociceptive, anti-inflammatory and anti-pyretic properties in animal models. The leaf extract (10-300 mg kg^{-1}) showed a dose-dependent anti-inflammatory activity in carrageenan-induced foot oedema in chicks, with an IC_{50} of 46.05±12.3 mg kg^{-1} which was approximately 3.5 times less potent than diclofenac (IC_{50}:13.01±5.28 mg kg^{-1}) and about 130 times less potent than dexamethasone (0.36±0.45 mg kg^{-1}). In the formalin test, the extract showed dose dependent antinociceptive effects in both phases of the formalin test. The role of adenosinergic and opioidergic involvement in the antinociceptive effects was also investigated. While theophylline, a non-selective adenosine receptor antagonist, completely inhibited the antinociceptive effect of the extract, naloxone, an opioid antagonist had very little effect. The extract also showed weak activity in pyrexia induced by baker's yeast. These results suggest antinociceptive as well as anti-inflammatory activities a confirmation of its traditional use. Also, the results show the involvement of adenosinergic pathway in the antinociceptive effects of FEE. (*Journal of Pharmacology and Toxicology 4 (4): 138-151, 2009*; ***doi:*** *10.3923/jpt.2009.138.151*)

Anti Inflammatory, Antinociceptive and Central Nervous System Depressant Activities of Marine Bacterial Extracts

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The main objective of this study is to isolate the bacterial strains which are producing biomedicinally relevant secondary metabolites. To achieve this, the ethyl acetate extracts of four marine bacterial strains BR1, PC4, EM13 and EM14 which were isolated from *Balanus amphitrite* (barnacle), *Polyclinum constellatum* (ascidian) and *Enteromorpha compressa* (Seaweed), respectively

subjected to study the anti inflammatory, analgesic and central nervous system depressant activities. Anti inflammatory activity was studied by carragennan induced rat paw edema model. Though the results were significant ($p<0.05$) for all the four bacterial extracts the more effective anti-inflammatory activity was exhibited by EM13 and EM14 (range between 20-59% of inhibition). Interestingly EM13 inhibited early phases, whereas EM14 inhibited the later phases of inflammation. These two extracts produced the same effect on analgesic activity which was studied by using hotplate test. However, the ethyl acetate extracts of EM13 and BR1 showed remarkable reduction in locomotor activity and prolongation of phenobarbitone sodium induced sleeping time that demonstrated the significant CNS depressant activity. The experimental data identified that the strains EM13, EM14 and BR1 contain potential pharmacologically active compounds and suggested that to further isolation and characterization of active principles and phylogenetic identification of the epibiotic bacterial strains. The present study evidenced that the bacteria associated with marine organisms are the potential sources of pharmacologically active natural products. (*Journal of Pharmacology and Toxicology 4 (4): 152-159, 2009*; ***doi:*** *10.3923/jpt.2009.152.159*)

Protective Effect of *Moringa oleifera* Lam. and *Lannea kerstingii* Extracts Against Cadmium and Ethanol-induced Lipid Peroxidation

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The present study had evaluated the protective effect of hydroalcoholic (50-50: v/v) and aqueous extracts of *L. kerstingii* and *M. oleifera* against lipid peroxidation induced *in vivo* and *in vitro* by either cadmium or ethanol. In a first series of experiments, lipid peroxidation induced *in vitro* by cadmium (5 μg mL^{-1}) is decreased by hydroalcoholic extracts of *M. oleifera* and *L. kerstingii* (100 μg mL^{-1}) by 94% and 50% ($p<0.001$) respectively whereas their aqueous extracts (100 μg mL^{-1}) reduced the cadmium induced lipid peroxidation by 94% ($p<0.001$) and 44% ($p<0.001$) respectively. *In vivo*, the pretreatment with hydroalcoholic extracts of *M. oleifera* and *L. kerstingii* at 1 g kg^{-1} b.wt. reduced significantly ethanol-induced lipid peroxidation, in liver, by 53 and 50% ($p<0.001$), respectively. Similar results were found in the kidney even though lipid peroxidation is slightly increased by ethanol in this organ. (*Journal of Pharmacology and Toxicology 4 (4): 160-166, 2009*; ***doi:*** *10.3923/jpt.2009.160.166*)

Hepatoprotective Activity of Aqueous and Methanolic Extracts of *Capparis decidua* Stems Against Carbon Tetrachloride Induced Liver Damage in Rats

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The aqueous and methanolic extracts of *Capparis decidua* stems locally known as Altoundob were screened for their hepatoprotective activity against CCl_4-induced hepatotoxicity in rats. This plant is used in traditional system medicine in the treatment of jaundice. Yet, no systematic studies on its hepatoprotective activity have been reported. The hepatotoxicity produced by administration of CCl_4 in paraffin oil (1:9 v/v) at a dose of 0.2 mL kg^{-1} for 10 days, was found to be inhibited by simultaneous oral administration of aqueous and methanolic extracts of *C. decidua* stems (200, 400 mg kg^{-1} b.wt.) for 10 days, with evidence of decreased level of serum aspartate amino transferase, alanine amino transferase, alkaline phosphatase and bilirubin. In addition, the concurrent administration of both extracts with CCl_4 for 10 days masked the liver fatty changes induced by the hepatotoxic compound observed in the intoxicated control rats. The results were compared with the hepatoprotective effect of the standard drug silymarin. The preliminary phytochemical screening of the powdered plant showed the presence of alkaloids, flavonoids, tannins, sterols, saponins, cyanogenic glycosides and cumarins as major conistituents of the studied extracts. The results of this study indicated that aqueous and methanolic extracts of *C. decidua* stems could afford a significant protection against Ccl_4-induced hepatotoxicity in rats. (*Journal of Pharmacology and Toxicology 4 (4): 167-172, 2009*; ***doi:*** *10.3923/jpt.2009.167.172*)

Antimicrobial Activity of *Curcuma longa* Aqueous Extract

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Ethnopharmacological relevance of *Curcuma longa* (Zingiberaceae) is known in many countries. The root of it was widely used as food ingredient and remedy. The present study aim to evaluate the antimicrobial activity of *C. longa* aqueous extract. The antimicrobial test was screened using agar diffusion method. The Minimum Inhibitory Concentration (MIC) were determined using agar dilution and confirm with broth macrodilution methods, while the Minimum Bactericidal Concentration (MBC). The aqueous extract of *C. longa* exhibited antimicrobial activity against *Escherichia coli* ATCC 25922, *Staphylococcus aureus* ATCC25923, *Krebsilla pneumoniae* ATCC 10031 and *Staphylococcus*

epidermidis ATCC 12228 (MIC = 4-16 g L^{-1}; MBC = 16-32 g L^{-1}). In conclusion, the *C. longa* aqueous extract exhibited good antimicrobial activity against some of tested bacteria at low concentration. The results provide promising information for the potential use of *C. longa* aqueous extract in the treatment of infection. (*Journal of Pharmacology and Toxicology 4 (4): 173-177, 2009;* ***doi:*** *10.3923/jpt.2009.173.177*)

Protective Effect of N-acetyl Cysteine and/or Pro Vitamin A against Monosodium Glutamate-Induced Cardiopathy in Rats

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In the present study the prophylactic effects of the antioxidants, β-carotene and/or N-acetyl cysteine (NAC) in ameliorating the metabolic abnormalities and oxidative damage induced cardiopathy under the effect of the flavor enhancers, monosodium glutamate (MSG) toxicity were studied. Animals were divided into 5 groups; G1: normal control, G2: MSG-treated group, Gs 3,4 and 5: animals pretreated with either NAC or β-carotene or their combination prior MSG administration, respectively. The present results revealed that, chronic administration of MSG caused metabolic dysfunction characterized by significant increases in the levels of serum glucose, total lipids, triglycerides (TG), total cholesterol (TCh) and Low Density Lipoprotein (LDL) and a decrease in the high density lipoprotein (HDL), parameters have important role in MSG induced cardiovascular disorders. The adverse effects of MSG may be related to an imbalance between the oxidant and antioxidant systems. This was indicated by marked increased levels of serum nitric oxide (NO) accompanied by pronounced increased level of thiobarbituric acid reactive substances (TBARS, marker of lipid peroxidation) and decreased levels of the antioxidants, L-ascorbic acid, glutathione (GSH), superoxide dismutase (SOD) and catalase (CAT) in cardiac tissue versus normal animals. Significant inhibition in cardiac Na^+/K^+ ATPase with increase in serum activities of creatine phophokinase (CPK) and aspartate aminotransferase (AST) were also observed in MSG treated animals as biomarker enzymes of cardiac tissue damage. This result was supported by myocardial infarction (necrotic lesion) observed by histopathological examination. Administration of either β-carotene or NAC prior MSG injection significantly modulated the alteration in most of the previously mentioned parameters to near their normal levels. Administration of synergistic combination of the these antioxidants showed the most significant effect as it has the ability to restore all of the studied parameters to their normal levels. The biochemical results were supported by the improvement in histological architecture of heart tissue, implicating that these antioxidants either alone or

their combination may protect heart from the harmful effects of cardio-toxic agents. (*Journal of Pharmacology and Toxicology 4 (5): 178-193, 2009*; ***doi:*** *10.3923/jpt.2009.178.193*)

In vitro Study on the Interaction of Caffeine with Gliclazide and Metformin in the Aqueous Media

Mohammad Mohiuddin, A.T.M. Zafrul Azam, Md. Shah Amran and Md. Amjad Hossain

An *in vitro* study of interaction of caffeine with gliclazide and metformin HCl has been studied at room temperature and at different pH. It has been found that caffeine forms stable 1:1 molecular complexes with gliclazide and metformin HCl. The studies have been carried out by various UV spectrophotometric and conductometric methods. Observation of the UV spectra of the two molecules in presence of caffeine has indication that it reacts with the anti-diabetic agents. The conductometric method was used to further ascertain about the nature of interaction and stoichiometries. The Ardon's Spectrophotometric method confirmed the formation of 1:1 molecular complexes and led to calculate the stability constants. It has been observed that the stability constants for caffeine-gliclazide system were higher than that of caffeine-metformin HCl system in all pH conditions. (*Journal of Pharmacology and Toxicology 4 (5): 194-204, 2009*; ***doi:*** *10.3923/jpt.2009.194.204*)

Study on Release Pattern and Potency Status of Ketoprofen Solid Dosage Forms Available in the Pharma-Market of Bangladesh

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Ketoprofen, a widely used analgesic drug is available in two solid dosage forms in the pharma-market of Bangladesh: enteric-coated tablet and capsule of sustained-release pattern. Seven brands of ketoprofen enteric-coated tablets and four brands of ketoprofen sustained release capsules were studied for their *in vitro* release behavior as well as potency status. From the seven samples of tablets, two brands (KT-03 and KT-07) were found noncompliant in respect of disintegration test in acid stage, whereas all the brands complied with BP (British Pharmacopoeia) specification in buffer stage at pH 6.8. The dissolution study of ketoprofen tablets were carried out in both acid and buffer stages and all the samples satisfied with USP specification in both stages. All of the brands of

ketoprofen capsule also complied with the USP specification. Potency was determined by UV spectroscopic method according to BP. Two brands (KT-03 and KT-07) of tablets were found non-compliant, whereas all the brands of capsules exerted compliance in respect of potency. (*Journal of Pharmacology and Toxicology 4 (5): 205-212, 2009*; ***doi:*** *10.3923/jpt.2009.205.212*)

Effects of Sedative Agent JM-1232(-) ((-)-3-[2-(4-methyl-1-piperazinyl)-2-oxoethyl]-2-phenyl-3,5,6,7-tetrahydrocyclopenta[f]isoindole-1(2H)-one) on the Carotid Arteries of Rats

H. Miki, J. Morita, R. Kato, Y. Ijiri and K. Tanaka

In the present study, we investigate whether JM-1232(-) ((-)-3-[2-(4-methyl-1-piperazinyl)-2-oxoethyl]-2-phenyl-3,5,6,7-tetrahydrocyclopenta[f]isoindole-1(2H)-one) affects vessels directly or indirectly. We examined the effects of JM-1232(-) with several antagonists on rat carotid arteries using the Magnus method. JM-1232 (-) suppressed contraction non-specifically on norepinephrine, potassium chloride and calcium chloride at a high concentration (E_{max}: 10^{-5}-10^{-4} M). There were no significant change in each pretreated group consisting of flumazenil, propranolol, atropine, cimetidine, imetit and N(omega)-nitro-L-arginine methyl ester, whereas a significant suppression was observed ($p<0.05$) in PK11195 (50% inhibition concentration (IC_{50}): 3.2±0.9 ($\times10^{-5}$) M) and diphenhydramine (IC_{50}: 5.6±1.7 ($\times10^{-5}$) M). These results suggest that only a high concentration of JM-1232(-) reacts for carotid artery relaxation directly (EC_{50}: about 10^{-5} M). Thus JM-1232 (-) (less than 10^{-6} M) might not directly induce a vessel relaxation that can cause hypotension. (*Journal of Pharmacology and Toxicology 4 (6): 213-220, 2009*; ***doi:*** *10.3923/jpt.2009.213.220*)

Hepatic Histopathological Abnormalities in Rats Treated Topically with Para-Phenylene Diamine (PPD)

Manuj Kr. Bharali and Karabi Dutta

Drug and chemical mediated hepatotoxicity for wide numbers of chemicals has been recognized. The drug mediated hepatotoxicity and its evaluation is an important aspect in the development of drugs intended for therapeutic usages as well as chemicals used as food and cosmetic additive. Para-Phenylene Diamine (PPD), a widely used chemical in almost all hair dye formulation has been tested for its hepatotoxicity after 30 days continuous topical application in three different

dosages (0, 1, 2 and 3 mg kg^{-1}) in Sprague-Dawley rats. Serum biomarker (ALT, AST and ALP) of liver injury exhibit a dose dependent increases over control animals. Histopathological findings include centrilobular coagulative necrosis, periportal inflammation, fibrinous deposition, hemorrhages and increased accumulation of neutrophils within hepatic parenchyma. The PPD mediated hepatotoxicity is seems to be enhanced by increased accumulation of neutrophils. (*Journal of Pharmacology and Toxicology 4 (6): 221-228, 2009*; ***doi:*** *10.3923/jpt.2009.221.228*)

Quantum Dots Biodistribution in Tissue Organs of Healthy Male and Female Mice

B.A. Ali, X.M. Wang, G.X. Xu, X.F. Zhao, X.T. Lin, X.Y. Zhang and H.B. Niu

Quantum Dots (QDs) are autoflorescence semiconductor nanocrystals that can be used for *in vivo* biomedical imaging. However, we know a little about their *in vivo* distribution in tissue organs and health consequences. The aim of this study was to detect QDs biodistribution in different organs from healthy female and male mice after single intravenous injection at the dose of 2.98 pmol CdSe/CDs/ZnS QDs/mouse for up to 14 day in female and 8 h in male mice. Laser scanning confocal microscope and/or florescence light microscopy was used to detect QDs in different samples. The results revealed that most of QDs were highly accumulated in spleen, liver, lung of treated mice; however, small amount of QDs was detected in kidney. There is no QDs were observed in other organs such as heart of female mice and brain of male mice of treated group. We also didn't find QDs in all samples prepared from control group and blood sample of treated mice at different time points. Effective and rapid (1 h) detection of tissue organs and blood samples using fluorescent imaging of quantum dots was demonstrated. This work was done using a very low dose (2.98 pmol/mouse) of injected Qds. (*Journal of Pharmacology and Toxicology 4 (6): 229-235, 2009*; ***doi:*** *10.3923/jpt.2009.229.235*)

Atropine Sulphate Induced Changes in Uterine, Adrenal, Liver and Thyroid Gland in Female Albino Rats

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In the present study, effect of atropine sulphate on uterine cytotoxicity, gravimetric changes, histopathology and biochemical analysis has been evaluated. Three groups of healthy adult female albino rats having six rats in each group were taken.

The rats of groups II and III were administered atropine sulphate at the dose level 0.1 mg and 0.2 mg/100 g b.wt., respectively intraperitoneally everyday between 10:00 and 11:00 am for 30 days. However, the rats of group I (control) were given saline alone. After the experimental periods, the rats were sacrificed and the histopathological study of uteri was performed. The uterine tissue of the rats of group II and III showed marked vascular congestion, epithelial necrosis and fibrous tissue proliferation. The fibrosis was extensive resulting into compression of endometrial glands. Desquamation of glandular epithelium was also observed. Histometric changes observed in uterine parameters like diameter, thickness of myometrium and endometrium and surface epithelial cell height were reduced significantly. Biochemical changes are parallel to the gravimetric changes, the protein and glycogen contents are reduced significantly with respective administration of graded dose of atropine sulphate. Although, the gravimetric analysis of adrenal, liver and thyroid gland were increased significantly due to administration of atropine sulphate. (*Journal of Pharmacology and Toxicology 4 (7): 236-245, 2009*; ***doi:*** *10.3923/jpt.2009.236.245*)

Immunomodulatory Effects of Swainsonine from *Ipomoea carnea* in Healthy Mice

A.O. Latorre, I.M. Hueza, D.P. Mariano-Souza, M. Haraguchi and S.L. Górniak

The objective of this study was to more clearly characterize the immunomodulatory effects of swainsonine and an *Ipomoea carnea* aqueous fraction using two different mouse strains: Swiss outbred mice and C57BL/6 inbred mice. The swainsonine is the main toxic principle found in the *Ipomoea carnea* a poisonous plant native from Brazil and other tropical countries. Many studies have shown that swainsonine promotes biological response modifications in different cell lines, such as increased murine splenic NK lymphocyte activity, improvement of peritoneal macrophage activity and macrophage cytotoxicity against tumor cells. In addition, it is suggested that swainsonine stimulates bone marrow cell proliferation in inbred mice. Therefore, we evaluated in this study the immunomodulatory effects of swainsonine and *I. carnea* aqueous fraction using for this analyses of macrophages activities and histology evaluation of lymphoid organ. Thereby, analyses of peritoneal macrophage activities showed decreased phagocytosis of aqueous fraction-treated Swiss mice and enhancement of both the spreading activity and PMA-induced H_2O_2 production of swainsonine-treated Swiss mice; however, no alterations in these parameters were observed in C57BL/6 mice. In addition, swainsonine and aqueous fraction treatment showed no differences for both Swiss and C57BL/6 mice in the thymus, spleen and bone

marrow evaluations and histological analyses of liver and kidney. In conclusion, a clear difference in swainsonine immunostimulant effect was observed when considering mouse strain, while the use of swainsonine alone did not induce bone marrow cellularity in healthy mice. (*Journal of Pharmacology and Toxicology 4 (7): 246-253, 2009*; ***doi:*** *10.3923/jpt.2009.246.253*)

Sub-Acute Toxicity Study of Fixed Dose Combination of Sulbactomax (Ceftriaxone-Sulbactam) in Swiss Albino Mice and Wistar Rat

A. Tamta and M. Chaudhary

The present study investigated safety/toxicity profile of Sulbactomax (Ceftriaxone-Sulbactam for injection), a fixed dose combination, in *Mus musculus* mice and SD rats at three dose levels, 10, 50 and 150 mg kg^{-1} ranging from asymptomatic to high dose. Sulbactomax was introduced in order to enhance the antimicrobial efficacy and to combat resistance towards beta-lactamase producing bacteria. The combination has been reported to be highly effective as well as synergistic for many resistant strains and carry the potential for its usage in empirical therapy for various bacterial infections. To establish the safety profile of combination, 28 days repeated dose sub-acute toxicity study was conducted on mice and rat (male and female). Various hematological parameters were studied in addition to physiological and biochemical parameters in order to study toxicity profile of Sulbactomax. There were no signs of toxicity observed at any of the dose levels used in this study. Animals from control and different treated groups exhibited normal body weight gain throughout the dosing period of 28 days. No mortality was observed in any of the treatment groups during the course of whole study. Hematological as well as biochemical parameters were unaltered at all three dose levels in Sulbactomax treated rat and mice. From the present study, it can be concluded that Sulbactomax (the fixed dose combination of Ceftriaxone-Sulbactam) is safe even at the dose level which is several folds of the intended human dose. (*Journal of Pharmacology and Toxicology 4 (8): 291-299, 2009*; ***doi:*** *10.3923/jpt.2009.291.299*)

Adaptogenic Activity of *Lagenaria siceraria*: An Experimental Study using Acute Stress Models on Rats

B.V.S. Lakshmi and M. Sudhakar

This study was conducted to evaluate the anti-stress potential of ethanolic extract of fruits of *Lagenaria siceraria* in rats. The present study was to investigate the

influence of forced swimming endurance stress on swimming endurance time, organ weights and changes in biochemical parameters in rats. The purpose of the study was also to investigate the acute heat stress induced changes in biochemical parameters, adrenal gland weight and stress induced perturbations in blood cell counts in albino Wistar rats. These activities were tested at oral doses of 100-400 mg kg^{-1} of the extract using *Withania somnifera* as a standard reference drug. Pretreatment with the extract at different doses significantly ($p<0.05$) ameliorated the stress-induced variations in this biochemical parameters-serum glucose, triglyceride, cholesterol, BUN and cortisol levels, blood cell counts and organ weights in these stress models. The extract treated animals also showed increase in swimming endurance time. This ability of *Lagenaria siceraria* to prolong the swimming time and ameliorate the stress induced changes in both stress models, therefore, suggests an antistress and adaptogenic property. (*Journal of Pharmacology and Toxicology 4 (8): 300-306, 2009*; ***doi:*** *10.3923/jpt.2009.300.306*)

In vitro and *in vivo* Effects of Glipizide and Gliclazide on the Protein Binding, Plasma Concentration and Serum Glucose, Cholesterol and Creatinine Levels of Ibuprofen

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The *in vivo* and *in vitro* study of effects of glipizide and gliclazide on protein binding and plasma concentration of ibuprofen has been conducted by equilibrium dialysis method at physiological temperature (37±0.5)°C and pH (7.4) and the measurements have been done by UV-spectrophotometry. It has been found that the percentage of protein binding of ibuprofen alone was 91% and in 1:1 mixtures with glipizide and gliclazide were 80 and 82%, respectively, at the saturation levels. The binding sites for ibuprofen-gliclazide system were found to be 3.1 and 2.11 and the binding constants were 0.37 and 0.45, respectively. Both glipizide and gliclazide lowered the affinity and percentage of binding of ibuprofen to serum albumin. It has been found that the interaction of glipizide and gliclazide with ibuprofen increased the free drug concentration of ibuprofen in plasma. It has been found that plasma concentration of ibuprofen after oral administration with glipizide and gliclazide is lowered than in the case of ibuprofen alone. On the other hand, it has been found that co-administration of ibuprofen and glipizide reduces blood sugar slightly but gliclazide reduces significantly but the values of cholesterol and creatinine are not lowered in the cases of gliclazide and glipizide in presence of

ibuprofen, rather they are seen to be higher. But the management of cholesterol and creatinine by gliclazide and glipizide are difficult tasks and leads to complications in many cases. It is thus clear that ibuprofen can be safely used in a combination therapy with gliclazide and better affectivity can be achieved. (*Journal of Pharmacology and Toxicology 4 (8): 307-313, 2009*; ***doi:*** *10.3923/jpt.2009.307.313*)

Dental Caries Inhibition in Albino Rats by *Breynia nivosus* Extract

E.S. Amadi, C.A. Oyeka, I. Okoli, J.I. Ihedioha and I.R. Iroha

The study investigated the caries inductive capacities of different sucrose concentrations and the anti-caries activity of *Breynia nivosus* extract in experimental albino rats. Different concentrations (70, 50, 30 and 10%) of sucrose-in-diet, were respectively fed to caries-free albino rats harboring *Streptococcus rattus* in their oral cavity, to determine their caries induction effect. Subsequently, 200 mg mL^{-1} of *Breynia nivosus* extract were intra-orally administered to the teeth surfaces of caries-free and non caries free rats to ascertain its possible caries curative and/or preventive effects. Direct observation, probing, microbial count and radiography were used to monitor the caries status of the rats. There were significant increase ($p<0.05$) in the microbial count of dental plaque of rat groups fed with 70, 50 and 30% sucrose-in-diet. However, milky white spots were only observed among the rat groups fed with 70 and 50% sucrose-in-diet at the 6th week of observation. The results of this investigation suggests that *Breynia nivosus* extract possesses some degree of *in vivo* caries preventive and curative effect on the teeth surfaces of albino rats fed simultaneously with 70% sucrose-in-diet. (*Research Journal of Medicinal Plant 3 (1): 1-8, 2009;* ***doi:*** *10.3923/rjmp.2009.1.8*)

Evaluation of the Hepatoprotective Effect of *Fumaria parviflora* and *Momordica balsamina* from Saudi Folk Medicine Against Experimentally Induced Liver Injury in Rats

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In a project to evaluate the efficacy of traditional Saudi plants used for liver problems the two plants *Fumaria parviflora* Lam. (Fumariaceae) and *Momordica balsamina* Linn. (Cucurbitaceae) were studied. The ethanol extract

of the aerial part of *Fumaria parviflora* and the leaves of *Momordica balsamina* were subjected to hepatoprotective assays using Wistar albino rats. Liver injury induced in rats using carbon tetrachloride. The biochemical parameters; serum glutamate oxaloacetate transaminase (SGOT), serum glutamate pyruvate transaminase (SGPT), alkaline phosphatase (ALP) and total bilirubin were estimated as reflection of the liver condition. Based on the results of the biochemical parameters measurements, histopathological study was performed on the liver of rats treated with two extracts. The normal appearance of hepatocytes indicated a good protection of the extracts from carbon tetrachloride hepatotoxicity. All the results were compared with silymarin, the reference hepatoprotective drug. (*Research Journal of Medicinal Plant 3 (1): 9-15, 2009;* ***doi:*** *10.3923/rjmp.2009.9.15*)

Phytochemical and Antibacterial Studies of Root Extract of *Cochlospermum tinctorium* A. Rich. (Cochlospermaceae)

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Methanol extract of the root of *Cochlospermum tinctorium* was evaluated for antibacterial activities using hole-in-plate bioassay technique against *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Corynbacterium ulcerans*, *Proteus mirabilis* and *Shigella dysentriae* using ciprofloxacin (10 μg mL^{-1}) and gentamicin (10 μg mL^{-1}) as reference standards. The extract was active on all the test organisms at concentration of 2000 μg mL^{-1}. The activity of the extract against *S. dysentriae* was found to be more potent with MIC 100 and MBC 500 μg mL^{-1}. Time kill studies showed that the antibacterial activities were time dependent. Phytochemical screening revealed the presence of alkaloids, flavonoids, tannins and cardiac glycosides. These phytochemicals could be responsible for the antimicrobial activities exhibited by the extract and hence justify the ethnomedicinal uses of *C. tinctorium*. (*Research Journal of Medicinal Plant 3 (1): 16-22, 2009;* ***doi:*** *10.3923/rjmp.2009.16.22*)

Comparative Study of the Ethanolic Extracts of Four Nigerian Plants Against Some Pathogenic Microorganisms

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The ethanolic extracts of *Cassia alata* (CA), Walnut-*Juglan nigra* (JN), *Ocimum basilicum* (OB) and *Aloe vera* (AV) were studied for their *in vitro*

antimicrobial activity against tested pathogenic microorganisms using Agar diffusion method. Preliminary phytochemical screening showed the presence of tannin, fats and oil, saponins and glycosides in the ethanolic extracts of all tested plants. *Juglan nigra* has the highest activity against all tested organisms *Escherichia coli*, *Staphylococcus aureus* and *Candida albican*. While the least activity against tested organism was shown by OB, ethanolic extracts of AV was the most effective against *Staphylococcus aureus*, while JN was the most effective against *Escherichia coli* and *Candida albican*. Also, the combined 600 mg mL^{-1} (concentration) of the four extracts showed a remarkable inhibitory effect on the organisms; produces over 50% of the activity of a standard antibiotic, Fulcin. Walnut-*Juglan nigra* (JN) showed the best antibacterial activity out of the four; hence this plant can be further subjected to isolation of the therapeutic antimicrobials and further pharmacological evaluation. (*Research Journal of Medicinal Plant 3 (1): 23-28, 2009;* ***doi:*** *10.3923/rjmp.2009.23.28*)

Effect of *Jatropha tanjorensis* J.l. Ellis and Soroja Leaves in Rabbits: Biochemistry and Ultrasonography

A.O. Akhigbe, M. Idu, E.S. Orhue, J.E. Ataman and S.O. Ehimwenman

Toxicological study of *Jatropha tanjorensis* leaves was conducted by evaluating changes in weight, biochemical and ultrasonographic parameters of rabbits that have been administered varying concentrations (0, 5, 10 and 25%) of the ground leaves mixed with feed-mash for a period of 30 days. There was no significant difference ($p<0.05$) in weight of rabbits. Renal function tests revealed that there was a significant reduction of serum urea concentration in the male rabbits ($p<0.05$) from 38.33 in group C to 18.33 in group D. This suggests that the amount of *J. tanjorensis* plant powder used in this study could interfere positively with the filtration function of the kidney in rabbits. The ultrasound picture of kidney, heart and spleen showed no significant change from the control, where as there was reduction in the size of the liver with increased echogenicity when compared with the control. This may be an indication of hepatic toxicity. (*Research Journal of Medicinal Plant 3 (1): 29-33, 2009;* ***doi:*** *10.3923/rjmp.2009.29.33*)

Evaluation of the Uterotonic Activity of the Aqueous Leaf Extract of *Ficus exasperata* Vahl (Moraceae)

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The leaves of *Ficus exasperata* Vahl Enum. Pl. vahl (Moraceae) are used by traditional healers in Southern Nigeria to arrest preterm contractions in pregnant

women and are also used as abortifacients in some parts of Africa. In this study the purported uterotonic activity of the aqueous leaf extract of *F. exasperata* (AET) was investigated *in vitro*. AET was obtained from the fresh leaves of the plant. The effect of the extract on rhythmic spontaneous uterine contractions was investigated and the extract was also directly tested on uterine tissues. The effect of the extract was compared with those of acetylcholine. The extract, at concentrations ranging from 2.5×10^{-2} to 100×10^{-2} mg mL^{-1}, significantly increased the frequency ($p<0.05$) but not the amplitude of spontaneous contractions and directly stimulated uterine contractions. Acetylcholine likewise, concentration-dependently stimulated uterine contractions and significantly increased the frequency ($p<0.05$) of spontaneous contractions. The aqueous leaf extract of *F. exasperata* at the concentrations used in this study stimulates uterine contractility which may account for its use in easing childbirth in some parts of Africa. (*Research Journal of Medicinal Plant 3 (2): 34-40, 2009;* ***doi:*** *10.3923/rjmp.2009.34.40*)

Preliminary Pharmacognostical Standardisation of *Ruta graveolens* L. Aerial Parts

I. Nazish, R.A. Kaskoos, S.R. Mir, S. Amin and M. Ali

Ruta graveolens L. belonging to family Rutaceae is commonly known as Common rue and locally as Sudab in India. It is an important medicinal plant used in capillary fragility, for eye diseases, as stimulant and emmenagogue. As the herb is used widely in the Indian traditional system, it was thought worthwhile to undertake the standardization of its aerial parts. Aerial parts consist mainly of leaves that are 3-5 inch long, flowers are tetramerous and fruits are 4-5 lobed. In the powdered form it had pungent odor and exceedingly bitter taste. Microscopical examination of powder of aerial parts showed fragments of epidermis, glandular trichomes, stone cells, lignified xylem elements and abundant calcium oxalate crystals. Successive extractive value was highest in aqueous extract (16.08% on dry weight basis). Mean ash values (%) were 8.13 (total), 2.01 (acid insoluble ash) and 1.02 (water soluble ash). Loss on drying was found to be 4.03% and pH values of aqueous extract was 6.74. Bitterness value of aerial parts was 1.28; foaming index was less than 100. Screening of all extracts indicated the presence of all phytoconstituents except saponins. TLC fingerprints of extracts of aerial parts were also developed. (*Research Journal of Medicinal Plant 3 (2): 41-44, 2009;* ***doi:*** *10.3923/rjmp.2009.41.44*)

Lipid Lowering Activity of *Globimetula braunii*

J. Okpuzor, G. Kareem and C. Ejikeme

Extract *of Globimetula braunii* in different solvent systems were evaluated for possible lipid and blood pressure lowering activities using *in vivo* and *in vitro* experimental methods. Dried *Globimentula brauni* leaves were pulverized into powder and successively extracted with methanol, hexane, chloroform, ethyl acetate, n-butanol and water using hot extraction methods. Normal male adult albino rats were administered a dosage of 200 mg kg^{-1} b.wt. of the extracts for a period of 14 days and the level of total cholesterol, triacylglycerol and lipid peroxidation were monitored. The crude extract of *Globimetula braunii* was analyzed for some antihypertensive substances using High Performance Liquid Chromatography (HPLC). The results obtained, showed that different fractions of the extract caused significant ($p<0.05$) decrease in serum total cholesterol, triacylglycerol and malonyldialdehyde (MDA) levels. HPLC elution profile showed that the crude extract contained substances similar to some known antihypertensive drugs like propanalol, lisinopril, moduretic and nifidipine and the lisinopril-like compound seems to be the most abundant by having the highest concentration. Thus, the data from this study suggests that *Globimetula braunii* extract contains some biologically active substances that may lower blood pressure and serum lipids. (*Research Journal of Medicinal Plant 3 (2): 45-51, 2009;* ***doi:*** *10.3923/rjmp.2009.45.51*)

Toxicological Studies of a Nigerian Commercial Polyherbal Product in Albino Rats

E.U. Etuk, V. Igbokwe, O.P. Ajagbonna and M.O. Egua

There have been earlier reports of herbal medicine toxicity elsewhere in Nigeria, China and India. The present study examined the possible acute and subchronic toxic effects of Nasara Pile Syrup (NPS), a Nigerian commercial polyherbal medicine in albino rats. Graded doses (0.5, 1.0, 1.5 and 1.75 mL/100 g) of the herbal medicine were administered to 4 groups of albino rats and their responses observed for 72 h to study the acute toxic effect of the herbal medicine. In the subchronic toxicity study, the rats were treated orally with repeated doses of the extract for 28 days after which the animals were slaughtered and samples from the liver, kidney and heart obtained for histopathological examination. The results showed that, administration of a single dose of the herbal medicine did not produce

any harmful effect or death in the animals. But in the repeated dose treatment, the herbal medicine produced a number of deaths and damages on the kidney, liver and heart of the rats that were evidenced by histopathological lesions in a dose dependent manner. Based on the results, it was concluded that, prolong administration of NPS may cause harmful effect in the consumers, therefore, the general public should exercise caution in taking this herbal remedy and they should be aware of the impending health risk that may be associated with it. (*Research Journal of Medicinal Plant 3 (2): 52-60, 2009;* ***doi:*** *10.3923/rjmp.2009.52.60*)

Reproductive Biology and Breeding System of *Aconitum balfourii* (Benth) Muk: A High Altitude Endangered Medicinal Plant of Garhwal Himalaya, India

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Aconitum balfourii (Benth) Muk an endangered medicinal herb of high altitude region was studied for reproduction biology. Controlled pollination studies were also conducted on plants grown under hothouse. Observation reveals that ravine and scree wild habitats of alpine region had better flowers and seed production. Furthermore, hot house grown plants had far more superiority over wild populations for flowers and seed production. Protandry type of dichogamy was observed and is viewed as an anti-selfing mechanism. In general, higher pollen germination was achieved comparatively at low concentrations of GA_3, IAA and IBA (1 ppm). Tube elongation was maximum upto 65 μm in IAA 1 ppm and 63 μm in IAA (5 ppm) and sucrose 5%. Dark condition along with violet color inhabits pollen germination whereas it enhances pollen tube elongation. Apomixis as well as autogamous self pollination was not observed in the species. However, fruit set differed significantly between the hand-selfed and hand-crossed treatments. Seed characteristics of open pollinated plants viz., number of seeds and seed yield per pod and plant were significantly at par than hand self pollinated flowers. Self-compatibility in the species may be a derived condition, considering that flowers are insect pollinated. The abundance and efficiency of pollinators may also affect mating patterns. The results of this study on the floral biology and breeding system of *A. balfourii* indicate reproductive potential of the species for cross-pollination, which would limit the production of selfed seeds and as such is likely to maintain sustainable levels of heterozygosity among the various populations. (*Research Journal of Medicinal Plant 3 (2): 61-68, 2009;* ***doi:*** *10.3923/rjmp.2009.61.68*)

Isolation, Characterisation and Antimicrobial Activity of a Steroidal Ester from the Leaves of *Cassia nigricans* Vahl.

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The aim of the study was to scientifically validate the claims that *C. nigricans* is used in traditional medicine for the treatment of skin diseases, infections and wounds. The leaves of *Cassia nigricans* is said to be used in traditional medicine for the treatment of peptic ulcer, gastro-intestinal disorders, diarrhoea and skin diseases. The glycoside present in the methanol extract of the leaves was hydrolysed using dilute hydrochloric acid. A silica gel column of the resulting aglycone (using petroleum ether:ethyl acetate mixtures) gave a white amorphous powder, identified as steroidal ester by means of spectral analysis. The antimicrobial activity of the steroidal ester was investigated against *Staphylococcus aureus*, *Streptococcus pyogenes*, *Corynebacterium pyogenes*, *Bacillus subtilis*, *Salmonella typhi*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Candida albicans*, *Neisseria gonorrhoeae* and *Klebsiella pneumoniae* using agar diffusion technique. The results showed that the compound was effective against all the test organisms and the minimum inhibitory concentration was found to be 2×10^3 μg mL^{-1}. (*Research Journal of Medicinal Plant 3 (2): 69-74, 2009;* ***doi:*** *10.3923/rjmp.2009.69.74*)

Evaluation of *Coleus forskohlii* Genotypes for Bio Chemical Characters

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Coleus forskohlii Briq., belonging to the mint family Lamiaceae, is an important ancient root drug credited with various medicinal properties. The root extracts of *C. forskohlii* were found to contain forskolin and its therapeutic properties contributed to the emergence of *C. forskohlii* as a taxon of importance in modern medicine. Traditionally it is used for pickle making and as a condiment in India. Thirty seven *C. forskohlii* genotypes collected from various places of the important *Coleus* growing states viz., Tamil Nadu and Karnataka were evaluated for total sugars, starch and crude protein at Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore to assess its suitability for edible purpose. The genotypes exhibited remarkable variations for all the characters studied. The total sugar, starch and crude protein content in the fresh tubers varied from 5.90 to 10.03 g, 6.97 to 20.94 g and 6.14 to 9.05 g per 100 g, respectively. The genotype CF 37 excelled in the accumulation of total

sugars, starch and crude protein in tuber and thus can be utilized for medicinal as well as edible purposes. (*Research Journal of Medicinal Plant 3 (2): 75-79, 2009; **doi**: 10.3923/rjmp.2009.75.79*)

Therapeutic Effect of Telfairia Occidentalis on Protein Energy Malnutrition-Induced Liver Damage

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Comparison was made between the efficacy of dietary protein replenishment and supplementation with *Telfairia occidentalis* leaves, in treatment of Protein Energy Malnutrition (PEM) induced liver damage. PEM rats were produced by feeding weanling rats a protein deficient diet (2% protein) for 28 days and then divided into four dietary treatment groups: 2% protein (group A; PEM control group); 20% protein and 10% *T. occidentalis* (group C); 20% protein (group D) and 10% *T. occidentalis* (group E). The protein deficient diet caused a significant increase ($p<0.01$) in hepatic malondialdehyde (MDA) level and the liver function enzymes alkaline phosphatase (ALP), alanine amino transferase (ALT) and aspartate amino transferase (AST) level in the serum. It also caused a marked reduction ($p<0.01$) in glutathione level, significant decrease ($p<0.01$) in the antioxidant enzymes superoxide dismutase (SOD) and catalase (CAT) and significant damage to the hepatocytes. Recovery diets of protein alone and protein supplemented with *T. occidentalis* had significant effects on all the parameters. The MDA level and the serum liver function enzymes were significantly reduced ($p<0.01$), glutathione and antioxidant enzymes levels were markedly increased ($p<0.01$) and a highly significant hepatocyte healing observed in the histology images. The highest recovery was however observed in group C. Results indicate the restorative ability of *T. occidentalis* in treatment of oxidative stress induced liver damage in PEM rats. (*Research Journal of Medicinal Plant 3 (3): 80-92, 2009; **doi**: 10.3923/rjmp.2009.80.92*)

Effect of Drying Treatment on the Content of Antioxidants in *Enicostemma littorale* Blume

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The Total Phenolic Content (TPC) and antioxidant activity of fresh and dried materials of *Enicostemma littorale* Blume were evaluated using the Folin-ciocalteau method, 2, 2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging activity and Ferric Reducing Antioxidant Power (FRAP) assays. Different drying

treatments especially, microwave treated plant material led to significant reduction ($p \leq 0.05$) in antioxidant properties of *E. littorale* in methanolic extracts as compared to that of the boiling water extracts, which appeared to exhibit significantly stronger antioxidant potentials ($p \leq 0.05$) even in dried plant materials due to greater solubility of compounds, breakdown of cellular constituents as well as hydrolysis of tannins. A strong free radical scavenging activity in the chosen plant material suggests that it has great potential in the food industry as functional food ingredient. (*Research Journal of Medicinal Plant 3 (3): 93-101, 2009;* ***doi:*** *10.3923/rjmp.2009.93.101*)

Anti-Ulcerogenic Activity of Two Extracts of *Parquetina nigrescens* and their Effects on Mucosal Antioxidants Defence System on Ethanol-Induced Ulcer in Rats

A.A.A. Kayode, O.T. Kayode and A.A. Odetola

The effect of two extracts of *Parquetina nigrescens* on mucosal antioxidants defense system in ethanol-induced ulcer in rats was studied. Activities of superoxide dismutase (SOD), catalase (CAT) and levels of reduced glutathione (GSH) were determined in the gastric mucosa and liver of normal and experimental groups of rats. The rats were pretreated with 500 and 1000 mg kg^{-1} of hexane and chloroform extracts of *P. nigrescens*, respectively dissolved in olive oil for a period of 14 days prior to ethanol induction. It was found that prior to ulcer induction, 14 days pretreatment with hexane and chloroform extract *P. nigrescenes* significantly reduced ethanol-induced gastric damage. The levels of GSH and activities of the antioxidants enzymes (SOD and CAT) were depressed significantly ($p<0.05$) in the ulcerated rats when compared with that of normal control. The activity of SOD was lower significantly ($p<0.05$) in the ulcerated mucosa and liver of the experimental rats when compared to the normal control group. There was a significant increase ($p<0.05$) in the level of CAT in the groups pretreated with the extracts compared to the ethanol group. A similar result was observed for GSH. Pretreatment with hexane extract caused 75.43 and 74.55% elevations in the activities of SOD in the mucosa and liver homogenate, respectively. Similar elevations were observed in the group pretreated with the chloroform extract. The cimetidine group also caused 69.79 and 69.67% elevation in the SOD activity in the mucosa and liver homogenate, respectively. The pretreatment with *P. nigrescens* was found to exact a significant gastro protective and antiulcer effect partly by protecting against the ethanol-induced ulcerogenic effects in experimental rats and probably through the induction of antioxidant enzymes. (*Research Journal of Medicinal Plant 3 (3): 102-108, 2009;* ***doi:*** *10.3923/rjmp.2009.102.108*)

Effects of *Piper sarmentosum* (Kaduk) Water Extract on Adiponectin and Blood Glucose Levels in Ovariectomy-Induced Obese Rats

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This study was conducted to evaluate the effects of *Piper sarmentosum* (PS) extract and glycyrrhizic acid (GCA) on plasma adiponectin and blood glucose in ovariectomy-induced obese rats. Twenty eight female Sprague-Dawley rats were randomly divided into four groups. Three groups were ovariectomized (OVX), while the remaining group underwent sham operation. The OVX groups were given PS water extract (0.125 g kg^{-1}), GCA (0.120 g kg^{-1}) and water (CTRL), respectively, while the Sham-Operated (SHM) group received only water. Plasma adiponectin and blood glucose were measured at zero, three and five months of treatment, while body weight was measured weekly. All the OVX groups had a significant reduction ($p<0.05$) in the plasma adiponectin compared to the SHM group. After three and five months of treatment, both PS and GCA treated group showed a significant increment ($p<0.05$) in the plasma adiponectin level compared to CTRL group. While, the blood glucose level, only PS treated group showed significant reduction ($p<0.05$) after three and five months of treatment compared to CTRL group but no significant difference ($p<0.05$) occurred in body weight compared to CTRL group. Our finding suggests that water extract of *Piper sarmentosum* may have the ability to reduce the amount of visceral fat in the body as shown by the increment of plasma adiponectin and improve blood glucose levels in obese rats. (*Research Journal of Medicinal Plant 3 (3): 109-115, 2009;* ***doi:*** *10.3923/rjmp.2009.109.115*)

Time-kill Curve Studies of Ampucare Against *Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae* and *Proteus vulgaris*

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Present study attempts to determine antimicrobial efficacy of Ampucare stored at different conditions by time kill curve studies against *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumoniae* and *Proteus vulgaris*. In all storage conditions, a rapid killing time was achieved by Ampucare. Bacterial count was less than 3 Log_{10} cfu mL^{-1} after 6 h of study in all organisms under study. No deviation in pattern of bacterial inhibition was found in all conditions of storage of Ampucare. There was no re growth reported even after exposure for longer time

under influence of Ampucare. In conclusion, Ampucare has good antimicrobial activity under all storage conditions of study against *E. coli*, *S. aureus*, *P. vulgaris* and *K. pneumoniae*. (*Research Journal of Medicinal Plant 3 (3): 116-122, 2009;* ***doi:*** *10.3923/rjmp.2009.116.122*)

Therapeutic Potential of *Citrus medica* L. Peel Extract in Carrageenan Induced Inflammatory Pain in Rat

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In this study, we planned to evaluate the antioxidative, anti-inflammatory and analgesic potential of *Citrus medica* peel extract. Antioxidant activity in different solvent systems was evaluated. Ethyl acetate extract of *Citrus medica* peel (EtCM) showed maximum 1,1-diphenyl-2-picrylhydrazyl (DPPH) and hydrogen peroxide radical scavenging activity in a dose dependent manner as compared to ascorbic acid. Further, anti-inflammatory and analgesic activities of EtCM (200, 300 and 400 mg kg^{-1}) were studied on carrageenan induced inflammatory pain in rats. Anti-inflammatory activity was assessed by measuring paw volume in rats. Analgesic activity was evaluated for its central and peripheral pharmacological actions by using hot plate, plantar, pin prick and mechanical allodynia tests in rats. EtCM (400 mg kg^{-1}) produced significant decrease in paw volume and pain as compared to diclofenac. Therefore, the *Citrus medica* peel extract may be used as a future antioxidant for the treatment of inflammation and pain. (*Research Journal of Medicinal Plant 3 (4): 123-133, 2009;* ***doi:*** *10.3923/rjmp.2009.123.133*)

Biological Activity of *Merremia emarginata* Crude Extracts in Different Solvents

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The plant *Merremia emarginata* (Burm. f.) Hallier f., belongs to Convolvulaceae family. In traditional medicinal system, different parts of *M. emarginata* have been mentioned to be therapeutically used as deobstruent, diuretic, for cough, headache, neuralgia and rheumatism. In the present study, biological activities of different solvent extracts isolated from *M. emarginata* were tested. Hexane (IA), ethyl acetate (IB), methanol (IC) and aqueous methanol (25%) (ID) extracts of *M. emarginata* were examined. Antioxidant properties of the extracts were studied by DPPH (1,1-Diphenyl-2-Picrylhydrozyl) radical scavenging activity method and superoxide radical scavenging activity method. Methanol extract exhibited better antioxidant activity than other extracts with

IC_{50} of 8.59 μg mL^{-1} in DPPH radical scavenging method. Methanol and hexane extracts exhibited α-amylase inhibitory activity with IC_{50} of 104.5 and 133.4 μg mL^{-1}, respectively. Ethyl acetate extract showed cytotoxicity with ED_{50} of 34.29 μg mL^{-1} in brine shrimp lethality assay. The present study revealed that the extracts IB and IC of *M. emarginata* were found to be showed promising biological activities. Methanol extract of this plant might be use full for antioxidant and antiobesity activities with minimal toxicity. (*Research Journal of Medicinal Plant 3 (4): 134-140, 2009;* ***doi:*** *10.3923/rjmp.2009.134.140*)

Effects of *Croton pendliflous* Methanolic Extract on Intestinal Enzymes and Protein Content in Pregnant Rats

T.O. Oyesola, F.S. Oluwole and O.A. Oyesola

The seeds of *Croton penduliflorus* (Family Euphorbiaccea) are often used as a purgative. The physiological effects of the methanolic extract on some intestinal disaccharide splitting enzymes were investigated in pregnant rats using an *in vivo* study. The extract was administered orally at a dose of 550 mg kg^{-1} body weight during the three phases of pregnancy. The extract caused a significant increase in maltase activity in the three phases of pregnancy, a significant increase in total protein concentration in early and late pregnancy and a significant increase in albumin concentration in early and mid pregnancy ($p<0.01$). The extract also caused a significant increase in sucrase activity in early pregnancy and in lactase activity in mid pregnancy. The present data suggest that increase activity of disaccharidase brush border enzymes most especially sucrase show that the extract might be having hyperplastic (growth) effect on the small intestinal enzyme activities, there is possibility of increased nutrients to the pregnant rats and fetuses. (*Research Journal of Medicinal Plant 3 (4): 141-145, 2009;* ***doi:*** *10.3923/rjmp.2009.141.145*)

Chemical Composition of Fixed Oil of *Olea europaea* Drupes from Iraq

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The present study was aimed to describe the fatty acid composition, stability and nutritional characteristics of fixed oil of *Olea europaea* drupes from Iraq, locally known as *Zaytoon*. The oil is commonly known as olive oil and is used throughout the world and is believed to have an important role in human health and nutrition. It is considered as one among newer source of edible oil. The oil is classified as

generally regarded as safe (GRAS). The fact that there are few reports of analysis of olive oil from Iraq in comparison to other parts of the world also lured us to examine chemically. Fatty acid composition of the olive oil was determined by capillary GC-FID. Thirty fatty acids (95.88%) were identified in the oil. The major fatty acids of the oil were oleic acid (68.07±1.089%), palmitic acid (12.12±0.162%), arachidic acid (9.78±0.155%), docosahexaenoic acid DHA (2.65±0.041%) and eicosapentaenoic acid EPA (0.53±0.01). The DHA and EPA are highly valued polyunsaturated fatty acid (PUFA) and part of several health foods and nutraceuticals. Peroxidizability index calculated for the oil was 27.37% and unsaturated/saturated ratio was 3.25. High unsaturated fatty acid content signified its potential as a health promoter. Moreover, it can be expected to offer considerable resistance to oxidative rancidity during storage. (*Research Journal of Medicinal Plant 3 (4): 146-150, 2009;* ***doi:*** *10.3923/rjmp.2009.146.150*)