Abstracts Presented at the 16th Conference of the Neuroscience Society of Nigeria

Prosopis africana seeds aqueous extract modulates brain and serum lipid profiles of female Wistar rats

Halimat A. Abdulrahim[1], Adeniran S. Adekunle[2], Adesola I. R. Abioye[3], Abdulrazaq B. Nafiu[4], Abdul-rahuf A. Feyitimi[4], Noah A. Omeiza[4], and Benedict B. Siaka[3], Tavershima M. Ateh[3]

[1]Department of Medical Biochemistry, [2]Department of Biochemistry, Faculty of Basic Medical Sciences, College of Health Sciences, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria; [3]Department of Anatomy, [4]Department of Physiology, Faculty of Basic Medical Sciences, University of Ilorin, Ilorin. Nigeria.
*abdulrahim.ha@unilorin.edu.ng

Lipid profile and atherogenic index have been shown to be substantial predictors for metabolic disturbances and challenges such as cost and adverse effects make investigation on plants and their bioactive components indispensable. This study seeks to evaluate the pharmacological potential of *Prosopis Africana* (PA) seeds aqueous extract on lipid metabolism in female Wistar rats. The rats (200-230g; n=10) were exposed to PA at varying doses (500 mg/kg b.w., p.o) or (1000 mg/kg b.w., p.o) once per day for thirty days. Control animals (n=5) were exposed to 0.2 ml/kg b.w/day physiological saline for the same period via intragastric gavages. Blood and brain tissue supernatants were collected for biochemical assays. The result showed a significant ($p<0.05$) influences of PA on total cholesterol, low density lipoprotein, high density lipoprotein concentrations in both serum and brain tissue; cardiovascular risk ratios and atherogenic index were being raised when compare PA-treated to control. Meanwhile, PA at 500 and 1000 mg/kg showed insignificant ($p>0.05$) decrease in serum triglycerides and very low density lipoprotein. These findings indicate that both PA regimen potentially increased serum lipids (TC and LDL-C) along with reduced HDL-C reflecting the characteristic dyslipidemic effect and their vascular hemodynamic disturbances which may favour plaque formation and promotes risk of atherosclerosis. Furthermore, PA dosages in brain homogenates modulate the lipid concentration (lowers TC and LDL-C, increases TG and HDL-C). Aqueous extract PA seeds enhanced transport of cholesterol from nervous tissues to the liver for further metabolic needs. Therefore PA possessed cardioprotective and neuroprotective properties.

Key words: Prosopis africana, Lipid profile, Lipid indices, Dyslipidemia, Atherosclerosis

Histology of the hippocampus of African straw coloured fruit bats (*Eidolon helvum*) experimentally infected with rabies virus

Zainab M. Bauchi[1]*, Joseph O. Hambolu[2], Judith N. Alawa[1], Ibrahim A. Iliya[1], Stephen P. Akpulu[1] and Sunday A. Musa[1]

[1]Department of Human Anatomy, Faculty of Medicine, Ahmadu Bello University, Zaria, Nigeria. [2]Department of Veterinary Anatomy, Faculty of Veterinary Medicine, Ahmadu Bello University, Zaria, Kaduna State, Nigeria
*zainab_bauchi@yahoo.com

Bats (Chiroptera) are well known reservoirs of several pathogenic zoonotic viruses. The rabies virus causes an acute encephalomyelitis that is fatal in 100% of cases. Most mammals are susceptible to this virus, while bats are able to with stand infections and are well known reservoirs of this virus. Bats appear to have developed an immune mechanism that fights the severity of the infection. The study examined the effect of the infection on the hippocampus. Forty African straw coloured fruit bats were obtained from roosts around Samaru, Zaria. Thirty five bats were experimentally infected with 105 median mouse intracerebral lethal dose (MICLD50) of the rabies virus intramuscularly into both left and right masseter muscles and then randomly grouped into seven groups (n= 5). One group served as control, which were sham inoculated with 0.02mL of distilled water. One group was sacrificed on each day 1, 3, 5, 7, 14, 21 and 28 days post inoculation (pi). The animals were anaesthetized using ketamine injection (0.1mL /10g) and then placed in a suffocating chamber. Brain tissue was collected at time of sacrifice for histological analysis. Histological analysis revealed neuronal vacoulation, pyknosis and necrosis as well as degenerated cells and gliosis in the experimental groups. The signs of degeneration were more severe as the infection progressed. Group 7 showed more signs of degeneration. In conclusion, experimental infection with rabies virus leads to severe neuronal damage in the hippocampus of African straw coloured fruit bats.

Key words: Hippocampus, African straw coloured fruit bats, Rabies virus

Ameliorative effects of aqueous garlic extracts on lead- induced neurobehavioural changes in Wistar rats

G. A. Hamza[1]* and A. M. Rabiu[2]

[1]Department of Human Anatomy, Faculty of Basic Medical Sciences, Yusuf Maitama Sule University Kano, Nigeria
[2]Department of Human Physiology, Faculty of Basic Medical Sciences, College of Health Sciences, Ahmadu Bello University Zaria, Nigeria
*hgadamu@gmail.com; +2348036944764

Body exposure to heavy metals including lead has been found to cause adverse effects especially on the nervous system which is the primary target. The aim of the study was to assess the ameliorative effects of aqueous garlic extracts on lead-induced neurobehavioural changes in Wistar rats. Twenty five (25) Wistar rats were used and were randomly divided into five groups. Group 1 received distilled water; served as a Control. Group 2 received lead acetate (120 mg/kg) only. Groups 3 and 4 received aqueous garlic extract at 300 and 500 mg/kg respectively after pretreatment with the 120 mg/kg lead acetate. Group 5 received Succimer (30 mg/kg) after pretreatment with the 120 mg/kg lead acetate. Neurobehavioural paradigms of Morris water maze and beam walk tests were employed to assess the spatial learning and memory and motor coordination respectively. Lead acetate caused significant ($p \leq 0.05$) changes on the spatial learning and memory and motor coordination when compared with the control group. In the Morris water maze test, there was a significant reduction of latency in the lead and aqueous garlic extract or Succimer groups while rats that were exposed to lead acetate only had an increased latency. Beam walking test results also showed significant increases in the latency and foot slips of the lead treated Groups 2, 3, 4 and 5 when compared with the Control group. These results clearly showed that the aqueous garlic extract could ameliorate the effects of lead acetate on spatial learning and memory and motor coordination.

Key words: Lead, memory and learning, Succimer, Morris water maze, Beam Walking, Garlic

The effect of aqueous leaf extract of *Bryophyllum pinnatum*" on learning and memory in male albino rat

S.C. Okoseimiema[1], H.B. Fawehinmi[1] and A. O. Ihunwo²

[1]Department of Anatomy, Faculty of Basic Medical Sciences, University of Port Harcourt, Nigeria.
[2]Morphological Anatomy Division, School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, South Africa

This study was carried out to investigate the effect of aqueous leaf extract of *Bryophyllum pinnatum* on memory and learning. Forty healthy male albino Wistar rats were divided into five groups: Group one was the control (distilled water); Group two (vitamin C); Group three (200mg/kg of *Bryophylum pinnatum*); Group four (400 mg/kg of *Bryophylum pinatum*); Group five (Thiopental). The administration was done intraperitoneally for two weeks, after which, memory and learning studies were carried out using Morris water maze and navigational maze tests. The results of the mean and standard error mean time taken by the control group, Vitamin C group, Thiopental group, *Bryophylum pinnatum* group given at 200mg/kg and 400 mg/kg to locate the platform in the Morris water maze experiment were 19.08±1.46, 11.504±0.996, 31.78±1.49, 16.16±1.42; 14.81±1.47. It was observed that, the mean time taken by *Bryophyllum pinnatum* group at 200 mg/kg to locate the platform was significantly longer than the vitamin C group ($p<0.05$). The mean time taken by the Thiopental group was significantly longer than other groups ($p<0.05$). The time taken by the control group to locate the platform was significantly longer than the time taken *by Bryophyllum pinnatum* at 400mg/kg ($p<0.05$). The result showed that the group that received Thiopental took significantly longer time to get to the end of the maze compared to all other groups ($p<0.05$). The findings in this study have shown that the use of aqueous leaf extract of *Bryophyllum pinnatum* may be useful in aiding memory and learning.

Key words: *Bryophyllum pinnatum*, Memory, Learning, Albino Wistar rat

Selection of dehydroascorbic acid as a potential agonist from molecular docking analysis of mu-opioid receptor

Akinyemi A. Omoniyi[1]*, Sunday A. Musa[1], Samuel S. Adebisi[1], Serene E. Daodu[1], Olawale S. Ajeigbe[2], Gbenga P. Oderinde[1], Ambrose O. George[3]

[1]Department of Human Anatomy, Faculty of Basic Medical Sciences, Ahmadu Bello University, Zaria, Nigeria. [2]Department of Veterinary Anatomy, Ahmadu Bello University, Zaria, Nigeria. [3]Department of Biochemistry, University of Ilorin, Ilorin, Nigeria.
*aaomoniyi2014@gmail.com; +2347038862108

The life-threatening sides effect of the current μ-opioid receptor agonist includes irregular heartbeat, anxiety, tremors, seizures, rashes, itching, and heart problems such as chest pain or fast-pounding heartbeat among others, necessitates the discovery of new potent and safe compounds as a therapeutic measure. In view of this, we out-source for the best-in-class agonist for this druggable target via computational tools. A phytochemical (glucaric acid, dehydroascorbic acid, acetamide and gluta-mine) found in the root of Panax ginseng plant and methadone (standard drug) were retrieved from PubChem compound database (PubChem CID: 33037) and μ-opioid receptor was retrieved from protein database. Receptor and ligand preparation was done using Pymol, and computational docking analysis was performed using PyRx, AutoDock Vina option based on scoring functions. Mu-opioid receptors mediate positive reinforcement following direct (morphine) or indirect (alcohol, cannabinoids, nicotine) activations and its function is central to the development of addiction therapies. Dehydroascorbic acid, the lead compound has a binding energy of -6.5 kcal/mol, while the standard compound has binding energy of -6.1 kcal/mol. Lead compound also has molecular weight is 174.11 g/mol, number of hydrogen bond donor is 2, number of hydrogen bond acceptor is 6, LogP is -0.56 and number of rotatable is 2. Docking studies and ADMET (absorption, distribution, metabolism, excretion, toxicity) evaluation of dehydroascorbic acid with μ-opioid receptor showed that this ligand is a druggable molecule which docked well with μ-opioid receptor. Therefore, dehydroascorbic acid plays an important role in stimulating μ-opioid receptor and thus, should be implicated as a potential agent in addiction therapies.

Key words: Dehydroascorbic acid, mu-opioid receptor, Ligand

Pivotal role of genes in addiction

A. H. Lawan[1]*, T. Yusuf, Abubakar Abdulrazak[2], I. D. Suleiman[3]

[1]Department of Human Physiology Ahmadu Bello University Zaria, Nigeria. [2]Department of Human Physiology, Kaduna State University, Nigeria. [3]Department of Human Physiology, School of Nursing, Kano, Nigeria.
*faradayscheele@gmail.com; 2347053562905

Addictions are common psychiatric disorders that exert high cost to the individual and to the society. Addictions are a result of the interplay of multiple genetic and environmental factors. They are characterized by phenotypic and genetic heterogeneity as well as polygenicity, implying a contribution of different neurobiological mechanisms to the clinical diagnosis. The prevalence of addiction in the world is on the increase and more prominent in developing countries which led to socioeconomic problems and morbidity. It occurs as a result of abnormal neurobiological changes in the brain due to abnormal/ distorted neurotransmitters, receptors, enzymes or certain proteins associated in synaptic plasticity and maintaining homeostasis. The condition is regulated by both environmental and genetic factors. The environmental factors are easily modified and the genetic factor can be modified through epigenetic mechanisms induced by drugs. Genes are inheritance based factors recently discovered to play important role in the pathogenesis of addictions and many disorders as explained by; Twin theory, adoption and family theory. Drugs addiction induced by gene expression could be explained using genome wide association and genetic environment interaction studies/ mechanisms. The effects of presence and variation of specific genes have been identify in the neuromechanisms of addiction which involved the genes for enzymes for metabolism of neurotransmitters, neuromodulators and the genes for their specific receptors within the central nervous system and drug altered genes expressions. The role of genetic polymorphism in enzymes such as monoamine oxidase, aldehyde dehydrogenase and cytochrome P450 cannot be over emphasized. Therefore understanding further the central role of genes in addiction is a promising approach in management and treatment of the condition.

Key words: Environment, Epigenetic, Genetics, Addiction, Neurotransmitters

Dissection of Wistar rat hippocampus using unaided eyes

*Oluwasegun D. Olatomide and Sunday A. Musa

Department of Human Anatomy, Faculty of Basic Medical Sciences, Ahmadu Bello University, Zaria, Nigeria
*segundavis1995.olatomide@gmail.com; +2348064770402

The hippocampus is one of the most widely studied areas in the brain because of its remarkable neuronal cell plasticity, functional role in memory processing and learning, and its involvement in some neurodegenerative diseases. Despite being one of the most studied areas in the brain, it is not easily assessable in experimental animals' such as mice and Wistar rats. In this study, we described a method suitable for the extraction of the hippocampus of Wistar rats using the unaided eyes. Three apparently healthy adult Wistar rats were used for this study. They were euthanized under anaesthetic condition with ketamine (75 mg/kg). Afterwards they were perfused with formol saline, the skull opened, and the brain harvested. A midline incision was made and the halves of the brain were separated. The medial surface of the halved cerebral hemisphere was faced upward and the cerebrum was dissected, and the hippocampus neatly and manually harvested. Using the manual extraction method, the hippocampus was isolated without distortion. Hence, this convenient and accurate dissection technique can be used for histologic, histochemical and histopathological study of the hippocampus, especially in developing countries. This method of extraction is less time consuming, aids the researcher in carrying out physical observation, morphometric studies and also allows for conservation of other important structures of the brain.

Key words: Hippocampus, dissection, extraction

Zinc deficiency in the neonatal Wistar rats' cerebral cortex contributes to intrauterine ethanol feoto-toxicity

I. S. El-ladan[1]*, and A. Sani[2]

[1]Department of Human Anatomy, Umaru Musa Yar'adua University, Katsina, Nigeria. [2]Department of Microbiology, Umaru Musa Yar'adua University, Katsina, Nigeria
*Ibrahim.shehu@umyu.edu.ng; +2348035120742

Alcohol intake during pregnancy has been shown to induce wide spectrum of disorders on new-borns referred to as foetal alcohol spectrum disorder. Fourteen female Wistar rats were mated with matured males in ratio 2:1 overnight following determination of oestrous phase. Pregnant dams were grouped into 7; Group A served as the control that received distilled water. Groups B, C and D were administered 0.5mL of 20% ethanol equivalent to 1st, 1st through 2nd trimesters and whole gestation periods respectively. Groups E, F and G were given 0.5mL of 30% ethanol accordingly. Following parturition, neonatal brain tissues were dissected out, cerebrum removed and homogenised in phosphate buffer solution for atomic absorption spectrophotometry. Histologic examination was conducted using routine H and E. Depleted amount of Zinc was observed in the cerebrum of the ethanol-treated groups compared to the control. The histological examination of the cerebral cortex showed normal cellular architecture in Group A, while revealing neurodegenerative changes, namely; pyknosis, satellitosis and degeneration of pyramidal cells in the ethanol-treated groups. Intrauterine ethanol ingestion at different phases of embryonic life resulted in Zinc deficiency in the cerebrum as well as histopathological presentations in the cerebral cortex of the ethanol treated neonates. The present study was aimed at evaluating the effects of intrauterine ethanol exposure on the histology and neurochemistry of cerebrum of neonatal Wistar rats at different periods of development.

Key words: Ethanol, Histology, Neurochemistry, Intrauterine, Cerebral cortex

Altered iron and copper cerebella metabolism in neonatal Wistar rats exposed to ethanol in-utero affects the development of sensory and motor reflexes

I. S. El-ladan[1]*, S. S. Adebisi[2], W. O. Hamman[1], A. A. Sadeeq[1], A. O. Ibegbu[3]

[1]Department of Human Anatomy, Umaru Musa Yar'adua University, Katsina, Nigeria. [2]Department of Human Anatomy, Ahmadu Bello University Zaria, Nigeria. [3]Department of Human Anatomy, Federal University, Abakaliki, Nigeria.

*Ibrahim.shehu@umyu.edu.ng; +2348035120742

Alcohol intake during pregnancy has been shown to induce wide spectrum of disorders on new-borns referred to as foetal alcohol spectrum disorder. The present study was aimed at evaluating the effects of intrauterine ethanol exposure on the neurobehaviour and neurochemistry of cerebellum of neonatal Wistar rats at different periods of development. Fourteen (14) female Wistar rats were mated with matured males in ratio 2:1 overnight following determination of oestrous phase. Pregnant dams were grouped into 7. Group A served as the control that received distilled water. Groups B, C and D were administered 0.5ml of 20% ethanol equivalent to 1st, 1st through 2nd trimesters and whole gestation periods respectively. Groups E, F and G were given 0.5ml of 30% ethanol accordingly. Following parturition, neonatal brain tissues were dissected out, cerebellum removed and homogenised in phosphate buffer solution for Atomic Absorption Spectrophotometry. Neurobehavioural developmental milestone was assessed on postnatal days 5, 6 and 7. Interrelated elevation of both Iron and Copper in addition to effect on development of sensory and motor reflexes was observed in the ethanol-treated groups compared to the control. Intrauterine ethanol ingestion at different phases of embryonic life affected the amount of trace elements namely iron and copper in the cerebellum as well as development of sensory and motor reflexes.

Key words: Ethanol, Neurobehaviour, Neurochemistry, Intrauterine