

Lipid Profile In Prolonged Administration Of Aqueous And Methanol Extracts Of Vitex Doniana And Bombax Buonopense Leaf In Albino Rats.

Nweke, Odinachi Lynda

Department Of Medical Biochemistry, Ebonyi State University, Abakaliki

Abstract:

Effects of prolong administration of aqueous and methanol leaves extract of *Vitex doniana* and *Bombax buonopense* on lipid profile of Albino rats was assessed. The rats were randomly assigned to five experimental groups A, B, C, D and E. Group A with 6 rats received only normal saline, rat feed as normal control. Group B and C received aqueous leaf extracts and Group D and E received methanol leaf extracts of *Vitex doniana* and *Bombax buonopense* respectively. Groups B, C, D and E were separately sub-grouped into four groups with 6 rats in each group. The sub-groups were given a single oral dose of aqueous and methanol these leaf extracts at the concentrations of 100, 200, 400 and 800 mg/kg body weights respectively for 21 days. The rats were weighed on the first day and then weekly till the end of the experiment. After which lipid profile were measured. At the end of 21 days, weight changes and histological sections of organs were examined, and was noticed that the percentage weight decrease with increase in extract administration was pronounced in *Vitex doniana* than *Bombax buonopense*. The decrease in weight suggests the presence of bioactive compound presents in the extracts. The administration of these extracts decreased the level of lipid profiles in a dose dependent manner. The result showed significant ($P < 0.05$) body decrease in level of cholesterol, LDL-C, Triacyl glyceride and increase in HDL-C. and that the extract has hypocholesterolemia effect lowering the atherogenic predisposing factors.

Keywords: *Vitex doniana*, *Bombax buonopense*, Lipid profiles, Weight, Extract, Hypocholesterolemia.

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I. Introduction

From creation, man has been dependent on plants for medicinal purposes. Plants have been used to treat a variety of ailments and the introduction of the orthodox medicine did not affect their use (Chan *et al.*, 2006). Currently, it is estimated that 80% of the world's population is still dependent on plants for their health needs (McGraw and Eloff, 2008). About 60% of the people in South Africa use plants in conjunction with pharmaceuticals (McGraw and Eloff, 2008). In many under-developed and developing countries, rural people are forced to use traditional medicine due to inaccessibility of healthcare facilities and escalating cost of modern medicine. Traditional patent dealers in Nigeria prepare their concoctions with plant parts. This practice remains a public health problem of enormous magnitude affecting over 500 million people yearly. The menace is increasingly a serious burden in most tropical countries and major cause of death in sub-Saharan Africa. The situation became more difficult since dose and active components of the plant extracts appeared difficult to determine in this medium of treatment. Half of the African's population live in the rural areas where this practice is endemic and 2-3 million people die every year.

Vitex doniana: Is a savanna species in wooded grassland and can also be found along forest edges. It can be found throughout tropical Africa. The fruit are black, edible, sweet and mealy. It is frequently eaten as a snack and sold in local markets. The fruits are approximately 3cm long and contain one to four seeds. The fruits are collected from April to June. Fresh fruits cannot be stored for long periods (Rioux and Legrand, 2007). *Vitex doniana* (*Verbanaceae*) is commonly called black plum "Ori-nla" is widely spread in Southwestern Nigeria as a perennial tree. In Nigeria, from information available from the indigenous traditional healers, a decoction of the chopped stem bark part of *Vitex doniana* is prepared and taken orally for the treatment of gastroenteritis. *Vitex doniana* is administered to ailments including diarrhea and dysentery. Also taken to improve fertility and the juice may be squeezed into the eyes to treat eye troubles. It is also used to treat liver problems.

Bombax buonopense: Is a large tropical plant that grows up to 40 meters high and the root can spread to 6 meters (Beentje and Smith, 2001). The bark is covered with large conical spines, especially when young, and sheds them with age to some degree. The branches are arranged in whorls; the leaves are compound and have 5 to 6 leaflets and 5 to 25 secondary veins. The individual leaflets have entire margins and are also large. The

underside of the leaflets may be glabrous or puberulous (Beentje and Smith, 2001). *Bombax buonopense* is widely distributed in Africa, from Ghana to Sierra Leone, Uganda and Gabon. The plant belongs to the family of *Malvaceae* and its Common vernacular name include 'Vabga' in Ghana, 'Kurya' in Hausa, 'Akpu' in Igbo and 'Ogbolo' in Yoruba. Leaves of *Bombax buonopense* have anti-diarrhea (Akuodor *et al.*, 2011). Decoction of powdered leaves are eaten as source or applied as a bath against epilepsy. Also, decoction of leaves is used for feverish conditions, pains and muscular aches. Also, leaves are used to treat liver disease. Both flower and young fruits are used as food (Beentje and Smith, 2001). The fruit are eaten by animal such as water chevrotain (Don Maydell, 1986). The plant extract of *bombax buonopense* have anti-microbial activity (Godwin *et al.*, 2011) and can be used to treat stomach aches.

II. Materials And Method

In this study 102 male albino rats were used. The rats were randomly assigned to five experimental groups A, B, C, D and E. Group A with 6 rats received only normal saline, rat feed and served as normal control, while B and C received aqueous leaf extract of *Vitex doniana* and *Bombax buonopense* respectively. Group D and E received methanol leaf extracts of *Vitex doniana* and *Bombax buonopense* respectively. Groups B, C, D and E were separately sub-grouped into four groups with 6 rats in each group. The sub-groups were given a single oral dose of aqueous and methanol leaf extracts of *Vitex doniana* and *Bombax buonopense* at the concentrations of 100, 200, 400 and 800 mg/kg body weights respectively for 21 days. The rats were weighed on the first day and then weekly till the end of the experiment. After which the Lipid profile: Cholesterol, Triacylglycerol, HDL and LDL were measured.

Biochemical Analysis

After the treatment period, the rats were allowed to fast for 24hrs and then anaesthetized using mild anesthesia (chloroform) and dissected. After, dissection blood was drawn directly from the heart using syringe (cardiac puncture). The blood specimens were stored in anti-coagulant free bottles. The liver and kidney were quickly excised and washed with cold physiological saline to remove blood and adhering tissues and then preserved in 10% formol acetic acid for histological analysis. The blood specimens were centrifuged at 3000rpm for 10 mins to separate the serum from the red cells and stored in specimen bottles until used for analysis.

Determination of Lipid profiles

Cholesterol Levels was determined using enzymatic spectrophotometric method by Allain and Roschlaw,(2001). Triacylglycerol was determined by the method of Quinica, (1978). Low density lipoproteincholesterols (LDL-C) were determined by the method of Curtius and Ruth, (1974). The method described by Burnstein *et al.*, (1970) was used to determine HDL-cholesterol.

Statistical Analysis

Results were expressed as mean \pm standard deviations (S.D) where applicable. The data were subjected to one-way analysis of variance (ANOVA), followed by the Dunca's test for individual comparisons using SPSS software and $p < 0.05$ was regarded as significant (Sokal and Rholf, 1969).

III. Results And Discussion

The administration of the aqueous and methanol leaf extracts of *Vitex doniana* and *Bombax buonopense* at 100, 200, 400 and 800 mg/kg bodyweight to albino rats decreased the level of lipid profiles in a dose dependent manner. Figure 1 showed that the levels of cholesterol decreased with increase in extracts administration. Figure 2, showed that only those rats administered methanol extracts of *Vitex doniana* at 100 mg/kg to 800 mg/kg and those administered with methanol leaf extracts of *Bombax buonopense* at 100 to 800 mg/kg and also aqueous leaf extracts of *Bombax buonopense* at 800mg/kg showed significant ($p < 0.05$) decrease in the level of triacylglycerol. In figure 3, aqueous *Vitex doniana* at 100mg/kg to 800 mg/kg and methanol *Vitex doniana* at 400 to 800mg/kg showed significant ($p < 0.05$) increase in the level of HDL-C. Figure 4 showed that only those rats administered methanol *Vitex doniana* extract at 200 to 800mg/kg and methanol *Bombax buonopense* extract at 100 mg/kg to 800 mg/kg showed significant ($p < 0.05$) decrease in the level of LDL-C. The data were represented as mean \pm S.D (n=6). Bars are the mean values, and (*) are signs of Significant difference at ($p < 0.05$) in comparison with the control.

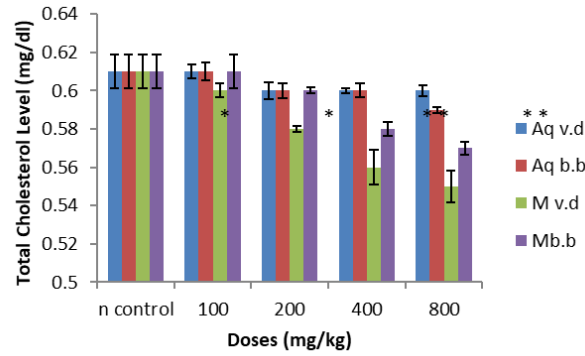


Figure 1: Level Of Total Cholesterol In Albino Rats Administered With Aqueous, Methanol Extracts Of Vitex Doniana And Bombax Buonopense Leaves.

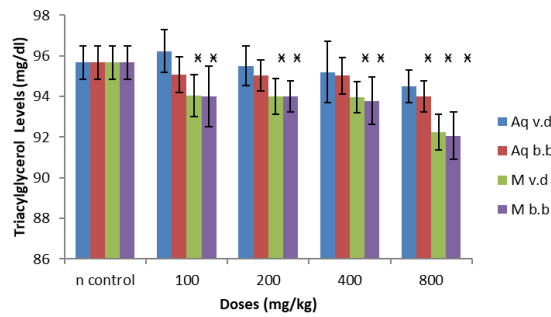


Figure 2: Triacylglycerol Level In Albino Rats Administered With Aqueous, Methanol Extracts Of Vitex Doniana And Bombax Buonopense Leaf.

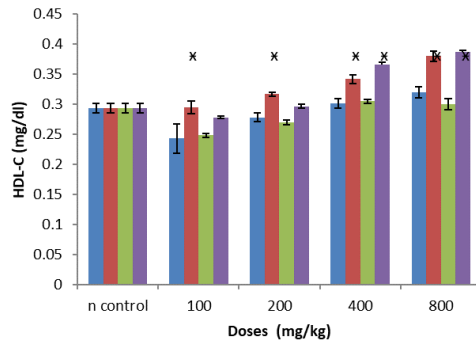


Figure 3: HDL-C Level In Albino Rats Administered With Aqueous, Methanol Extracts Of Vitex Doniana And Bombax Buonopense Leaf.

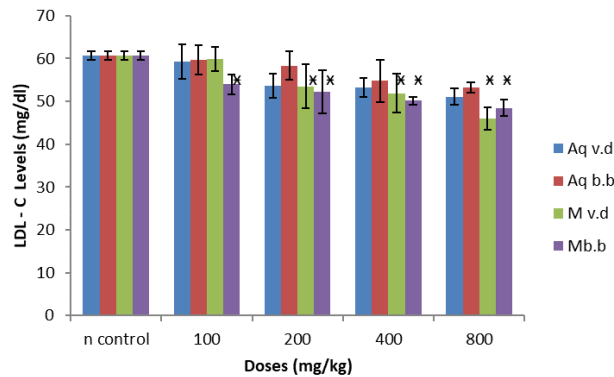


Figure 4: LDL-C Level In Albino Rats Administered With Aqueous, Methanol Extracts Of Vitex Doniana And Bombax Buonopense Leaf.

Weights of Rats and Extracts Doses during 21 Days of Administration.

Generally, mean body weight of the albino rats decreases during period of extract administration as shown in Fig 5 – 8. The data were represented as mean \pm S.D (n=6). Bars are the mean values, and (*) are signs of Significant difference at (p<0.05) in comparison with the control.

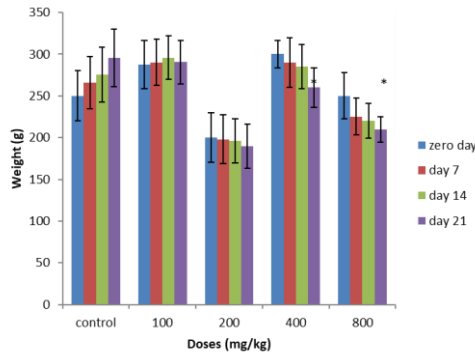


Figure 5: Weight Of Rats Administered With Aqueous Extract Of Vitex Doniana Leaf.

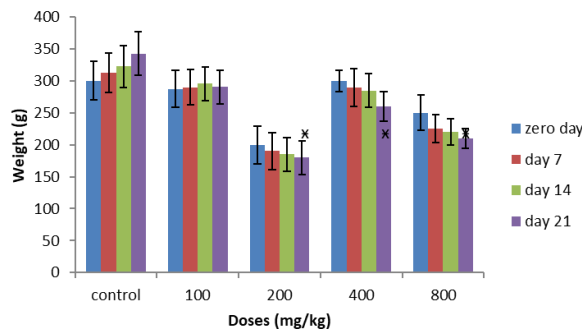


Figure 6: Weight Of Rats Administered With Methanol Extracts Vitex Doniana Leaf.

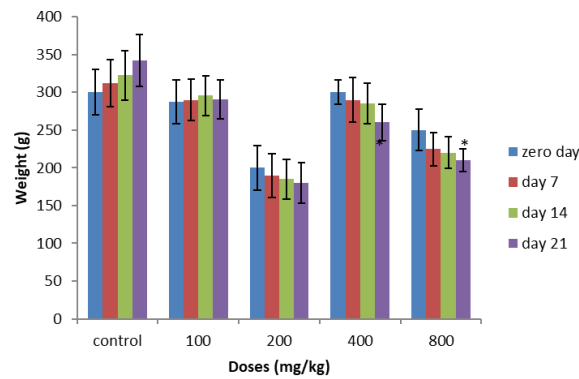


Figure 7: Weight Of Albino Rats Administered With Aqueous Extracts Of Bombax Buonopense Leaf.

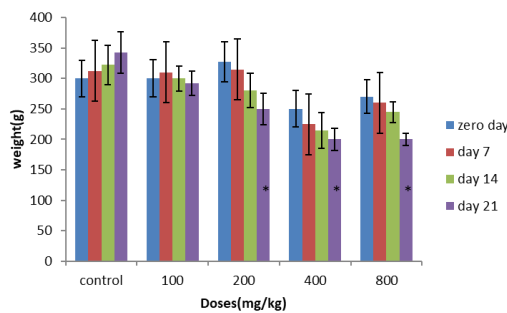


Figure 8: Weight Of Rats Fed With Methanol Extract Of Bombax Buonopense Leaf.

IV. Conclusion:

The result obtained showed that the extracts of two plant leaves have hypolipidemic potential, because as the concentration of the extracts administered increased, the cholesterol level decreased. This may be as a result of progressive metabolic control of the two plants leaves extract on the mechanisms involved in elimination of the lipids from the body. In the cause of administration of this extract for 21days at 100, 200, 400 and 800 mg/kg doses, the percentage weight gain decreased with increase in extract administration. This was more pronounced in *Vitex doniana* than in *Bombax buonopense*. The overall weight gain in the control rats was much higher than those of the extract treated group. The decrease in weight in extract treated rats may be due to decreased feed consumption since the animals were depressed and inactive especially at higher doses. It also may be due to the indirect effect of saponin present in the extract. Saponin are known to cause bloating, thereby reducing the appetite of the treated animals (Trease and Evans, 1989). Furthermore, orally administered saponin is known to indirectly affect the hematological parameters by reducing the appetite of the animal (Trease and Evans, 1992), So increase in body weights which occurs during first week was attributed to decreasing tannin concentration. Tannin binds to compound such as fibre, protein and prevents their digestibility and subsequently reduce growth rate of the animals (Huang *et al.*, 2010)

References

- [1] Akuodor, G. C., Muazzam, I., Usman-Idris, M., Megwas, U. A., Akpam, L., Chilaka, K. C., Okoroafor, D. O. And Osunkwo, U. A. (2011). Evaluation Of The Anti-Diarrheal Activity Of Methanol Leaf Extract Of *Bombax Buonopense* In Rats. *Ibnosina Journal Of Medicine And Biomedical Sciences*, 3(1):15-20.
- [2] Allain, O. P. And Rosechlaw, A. F. (2001). *Biochemical Analysis And Measurement Of Serum Vitamin C (Ascorbic Acid) Level*, Third Edition, Oxford University Press, New York, 80 – 89
- [3] Beentje, H And Smith, S. (2001). *Plants Systematics And Phytogeography For The Understanding Of African Biodiversity. Systematics And Geography Of Plants*, 71(2): 284-290.
- [4] Burnstein, M., Scholruck, H. R. And Mortin, R. (1970). Rapid Methods For The Isolation Of Lipoproteins From Human Serum By Precipitation With Poly Anions. *Journal Of Lipid Research*, ii(583): 234-240.
- [5] Chan, K. F., Eze, C. A., Emuelosi, C. E. And Esiimone, C. O. (2006). Antibacterial And Wound Healing Properties Of Methanolic Extracts Of Some Nigerian Medicinal Plants. *Journal Of Ethnopharmacology*,104:164-167.
- [6] Curtius, H. C. And Roth, M. (1974). The Hdl- Cholesterol Levels In Liver Smokers. *European Journal Of Clinical Nutrition*, 20(5):330-401.
- [7] Don Maydell, (1986). Indigenous Multipurpose Trees Of Tanzania: Uses And Economic Benefit. *Journal Of Ethnomedicine*, 54(2): 38-40.
- [8] Godwin, C. A., Augustine, D. E., Jemilat, A. I., Bassey, A., Joseph, L. A., Nwakaego, C. I. And Simon, C. O. (2011). Phytochemical And Antimicrobial Properties Of The Methanolic Extracts Of *Bombax Buonopozense* Leaf And Root Extracts. *Asia Journal Of Medical Sciences*, 2: 190-194.
- [9] Huang, X. D., Liang, J. B., Tan, H. Y., Tahya, R., Khamseekhiew, B. And Ho, Y. W. (2010). Molecular Weight And Protein Binding Affinity Of *Leucaena* Condensed Tannins And Their Effects On Invitro Fermentation Parameters. *Animal Feed Science And Technology*, 159:81-87.
- [10] Mcgraw, L. J. And Eloff, J. N. (2008). Ethnoveterinary Use Of Southern African Plants And Scientific Evolution Of Their Medicinal Properties. *Journal Of Ethnopharmacology*, 119: 559-574.
- [11] Quinica, A. (1978). Method Used In Determination Of Triglyceride In Human Body. *Journal Of Science* 5: 2-9.
- [12] Rioux, V. And Legrand, P. (2007). Saturated Fatty Acids. Simple Molecular Structures With Complex Cellular Functions. *Current Opinion In Clinical Nutrition And Metabolic Care*, 10: 752-58.
- [13] Sokal, R. R. And Rholf, F. J. (1969). *Practice Of Statistic In Research*, Freeman Press, San Francisco, Calif, Usa.
- [14] Trease, G. E. And Evans, W. C. (1989). *Pharmacognosy*, Second Edition, Brailliere Tindal, London, 9-11.