



Sub-acute effects of orally administered Ethanol extract of Root of *Sarcocephalus latifolius* (African peach) on Liver function markers of Wistar albino Rats

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Abstract

Ethanol extract of root of *Sarcocephalus latifolius* was administered to albino rats to determine possible effects on some liver function indices. Thirty rats, divided into six groups (A, B, C, D, E, and F) of five animals per group, were used for the study of the liver enzymes. Graded doses of the extract, 100, 200, 300, 400 and 500, mg/kg body weight, were administered orally for twenty-eight days, to test groups A – E, respectively, with group F as control (without extract). Alkaline phosphatase (ALP), alanine aminotransferase (ALT), aspartate aminotransferase (AST) activities were determined using standard colorimetric methods according to the specifications of the manufacturer (RANDOX Laboratories Ltd, UK). A total of eighteen rats, divided into three groups of six animals each and labelled groups A, B, and C were used to study serum bilirubin. Groups A and B were orally administered 500mg/kg and 800kg/kg, body weight, for twenty-one days while group C served as control, without extract. The assays were colorimetrically done with spectrophotometer. Non-significant decreases ($p > 0.05$) were resolved for ALP, while decrease in activities of ALT were all significant ($p < 0.05$), except for group E ($p > 0.05$). There were inconsistent changes in AST activities, with all changes being non-significant ($p > 0.05$). Decreases in both total and conjugated bilirubin were nonsignificant ($p > 0.05$), while nonsignificant elevations were observed for unconjugated bilirubin. The liver was apparently not affected by the root extract of *Sarcocephalus latifolius* to any significant extent suggesting absence of toxicity on the organ with regard to the parameters studied.

Keywords: liver, ethanol extract, toxicity, *Sarcocephalus latifolius*

Introduction

Sarcocephalus latifolius is one of the commonest names in the list of medicinal plants of the world and identified with various names. In West Africa, it has acquired different names among nations and tribes. In Nigeria, the Igbo people call it ubulu-inu, the Hausas call it Doundake, Tafashiya or tashiyaigia, while the Yoruba tribe identifies it as opepe. Other locals of Nigeria surely must have peculiar vernacular names associated with it. The various English names are pin cushion tree, African peach, Guinea peach, or Sierra Leone peach.

Sarcocephalus latifolius has been identified with so many pharmacological activities that have made it attractive in herbal market. Potentially it could be a source of lead for development of a number of effective and essential modern drugs¹. Some common pharmacological attributes of the plant include the control of malaria^{2,3,4}, a disease endemic in West Africa and the tropical regions of the world; cardiovascular, spasmolytic, and anti-parasitic effects^{5,6,7,8}. Others include uses as tonic and in fever, dental problems, diarrhea, dysentery and is suitable for use as chewing stick; as antihypertensive⁹ and antimicrobial^{10,11}. Possible sedative actions were predicted¹².

With these examples and many more, it is evident that *Sarcocephalus latifolius* has significant recognition in herbal/traditional healthcare delivery. It becomes very imperative to continue to scientifically subject this plant to various analyses to establish its usefulness, expose any possible dangers in form of toxicities and to exploit its obvious potentials as a source of chemical leads for development of modern useful and essential drugs. This study seeks to determine the possible effects of root extract of *Sarcocephalus latifolius* on certain biochemical indices relevant to liver functions.

Material and Methods

Collection and processing of plant materials: Identification of *Sarcocephalus latifolius* was done by P.O. Ugwuozor of the Department of Botany, Nnamdi Azikiwe University, Awka, Nigeria. Freshly harvested roots were cut into smaller pieces and adequately dried under shade. The dry roots were then ground to fine powdery texture.

Preparation of root extract: The ground sample, about 1kg weight, was soaked in ethanol within 48 hours. The solvent was filtered and concentrated by means of rotary evaporator, RE 52-

2 (Searchtech Instruments). The concentrate was collected in a suitable container and used for all administrations in this study.

Experimental animals: The wistar albino rats used were purchased from the Veterinary department of the University of Nigeria, Nsukka, Nigeria. They were housed in their groups in separate cages in an adequate animal house of the Department of Applied Biochemistry, Nnamdi Azikiwe University, Awka, Nigeria and were adequately fed with appropriate feed formula. They were acclimatized for four days prior to administration of the extract.

Administration of extract: Thirty wistar albino rats were divided into six groups of five animals per group were used to study the effect of the extract on serum activities of some liver enzymes namely alkaline phosphatase, alanine aminotransferase, and aspartic aminotransferase. The experimental groups A, B, C, D and E were orally administered increasing doses of 100, 200, 300, 400, and 500, mg/kg body weight, respectively, daily for twenty-eight days. Animals in the sixth group (F) did not receive the extract but were sustained on normal ration and served as control.

A separate set of eighteen rats, divided into six animals per group and labeled A, B, and C, were used for the study of bilirubin. Groups A and B were used for the experimental studies and were administered the extract at doses of 500 and 800, mg/kg body weight respectively. Group C, without the extract was used for control. Administration was performed once daily for twenty-one days.

Preparation of serum sample: All the animals were sacrificed according to their groups about 24 hours after the last dose was administered. By means of sterile syringes and needles, the blood was drained from each animal by cardiac puncture and

emptied into designated centrifuge tubes for the separation of serum. The tubes were left to stand at room temperature for thirty minutes and then centrifuged at 4000 rpm for five minutes in an 80-1 electric centrifuge (B-Bram Scientific and Instrument Company, England).

Assay of Enzymes and bilirubin: All three enzymes namely alkaline phosphatase (ALP), alanine aminotransferase (ALT), and aspartate aminotransferase (AST), were all assayed by the method of colorimetry using reagent kits of the RANDOX Laboratories Limited, UK. All analyses were done according to the specifications of the Manufacturer.

Bilirubin was determined by the method involving reactions with diazotized sulphanilic acid, as described by Srivastav and coworkers¹³.

Statistical analysis: Data obtained from this study were analysed using the statistical package for social sciences (SPSS) version 18.0 for windows. Analyses of variance (ANOVA) were used to compare means; values were considered significant at $p < 0.05$.

Results and Discussion

Figure 1 shows the mean activities for alkaline phosphatase (ALP), alanine aminotransferase (ALT) and aspartate aminotransferase (AST) in five test groups administered with varying doses of the extract, and the control. ALP activities were nonsignificantly decreased comparative with that of the control ($p > 0.05$), whereas the decrease in activities of ALT were all statistically significant ($p < 0.05$), except for group E ($p > 0.05$). However, irregular but nonsignificant changes were observed for AST.

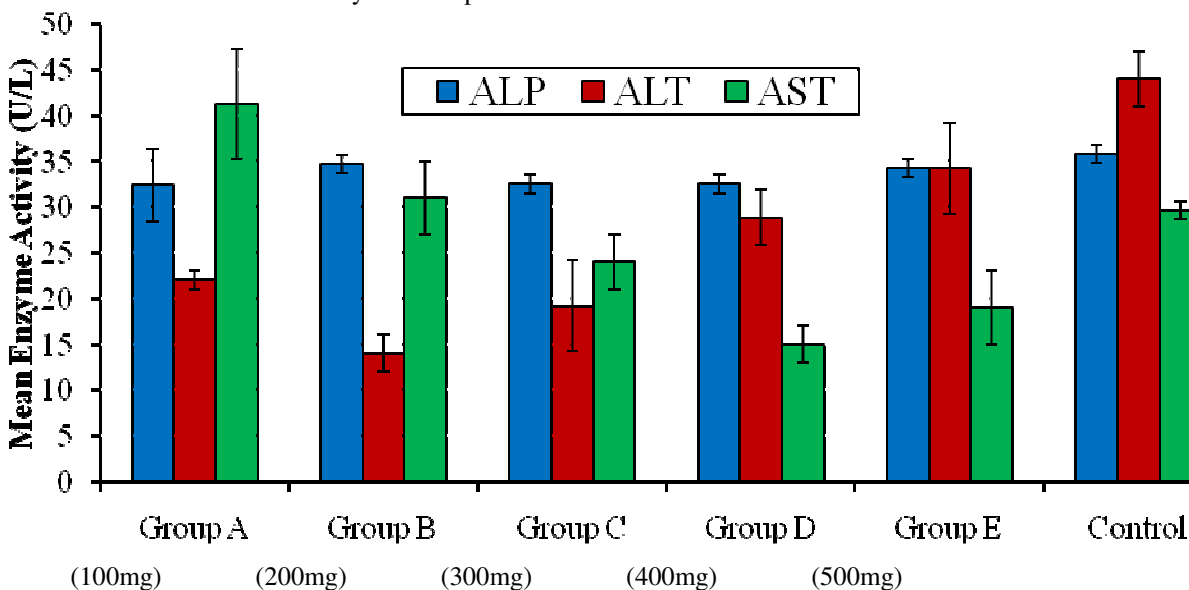


Figure-1
Mean activities of ALP, ALT and AST (Data represented as mean \pm SEM)

Figure 2 shows the results of effects of two dose schedules of root extract of *Sarcocephalus latifolius* on bilirubin. Very small increases observed for total bilirubin were statistically nonsignificant ($p > 0.05$). For conjugated bilirubin, nonsignificant decreases ($p > 0.05$), were observed for the test groups compared with that of the control. The mean values for unconjugated bilirubin showed nonsignificant elevations ($p > 0.05$) from the mean of the control. Generally, bilirubin concentrations were apparently unaffected by the extract.

Discussion: Biochemical parameters are commonly affected by drugs/herbal extracts and various physiological abnormalities. For example, some herbal extracts are known to increase serum liver enzymes¹⁴. The hepatotoxicity of aqueous extract of *Azadirachta indica* on the liver of rabbits had been reported¹⁵. It has been suggested that elevated levels of diagnostic enzymes in plasma may be a consequence of increase in the rate at which enzymes are synthesized involving induction of appropriate liver enzymes by certain drugs^{16,17}, among other factors.

This study had revealed that root extract of *Sarcocephalus latifolius* had no significant influence on serum alkaline phosphatase (ALP) as insignificant decreases were recorded. The extract, however, significantly decreased ($p < 0.05$) alanine aminotransferase (ALT) but affected aspartate aminotransferase (AST) insignificantly ($p > 0.05$). A previous report of insignificant effect of *Aspilia africana* leaves extract on ALP¹⁸, was similar to the results of this study. They however reported significant increases in ALT and AST. Normal activities were recorded for serum ALP, ALT, and AST¹⁹, from which they inferred absence of damage to the liver and kidney. They opined that normal values for these parameters after administration of extracts would mean absence of damage to the liver and kidney. Significant increases in ALP, with nonsignificant increases in ALT and AST have been reported¹⁴. However, a report of significant decreases in AST and ALT as a consequence of enzyme inhibiting effects of plant extract was made²⁰. Another source also cited increased activity of ALP above control levels²¹. Reports of up and down fluctuations in the activities of these enzyme parameters by different plant extracts are quite consistent with the findings of this study.

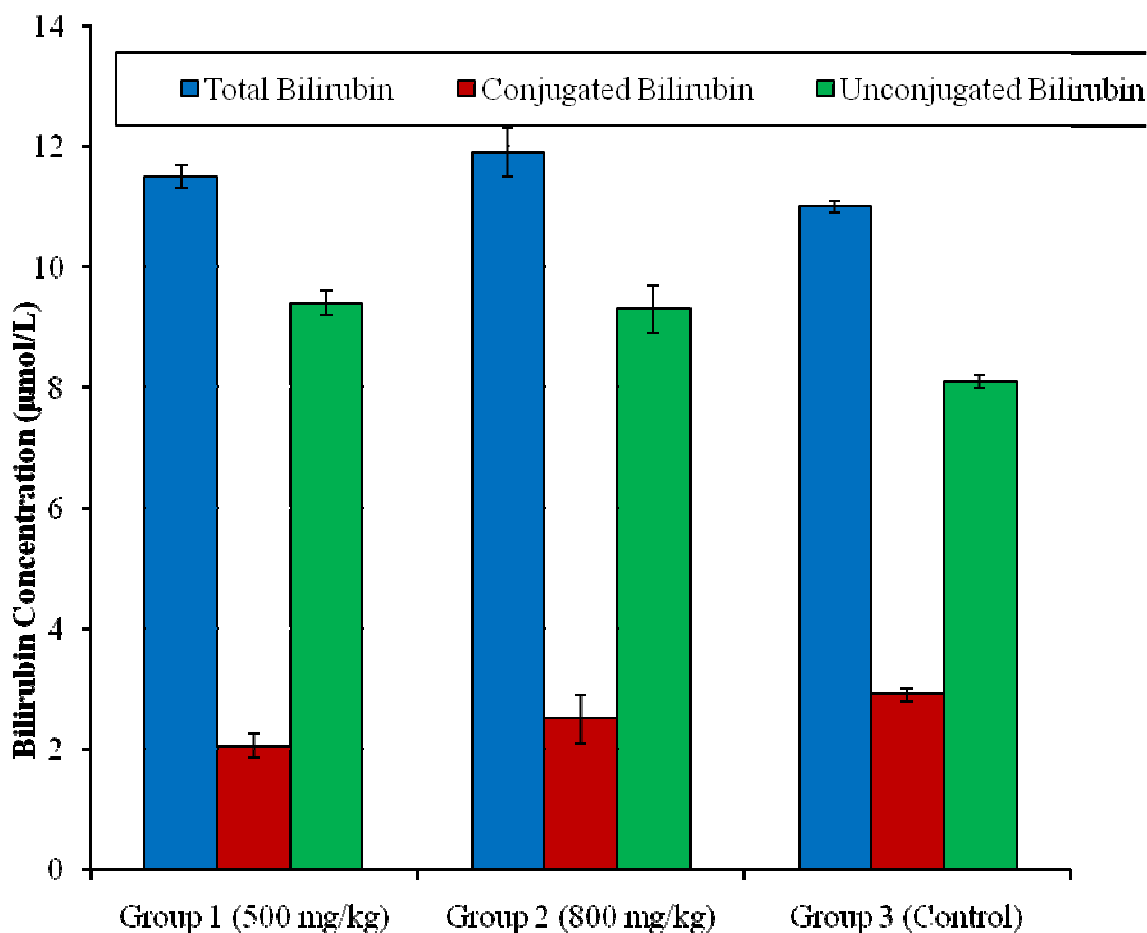


Figure-2
 Mean bilirubin concentrations (Data represented as mean ± SEM)

Alkaline phosphatase is present in most tissues but is particularly in high concentration in the osteoblasts of bone and the cells of the hepatobiliary tract, intestinal wall, renal tubules and placenta. Aspartate aminotransferase is present in high concentrations in cells of cardiac and skeletal muscle, liver, kidney and erythrocytes. Damage to any of these tissues may increase plasma AST levels. Besides numerous causes (pathological), various drugs can cause increases in AST levels. Alanine aminotransferase is present in high concentrations in liver and, to a lesser extent, in skeletal muscle, kidney and heart. Besides many other causes, certain drugs can cause increases in ALT levels. Generally, reductions in these enzyme parameters by administered substances in any significant capacity could be corrective of organ/tissue damage. Thus, decreases in these enzymes observed in this study could imply absence of damage to relevant organs, especially liver and kidney, in line with the opinion of Vijayalakshmi¹⁹.

The results of the studies showed that total bilirubin was increased insignificantly ($p > 0.05$) by *Sarcocephalus latifolius* root extract. Conjugated bilirubin decreased significantly ($p < 0.05$) while unconjugated bilirubin increased insignificantly ($p > 0.05$).

Drugs may compete with bilirubin for binding to protein (ligandin) in a manner that adversely affects conjugation and excretion. Inhibition of glucuronyl transferase by certain drugs may complicate unconjugated hyperbilirubinaemia and this is indicative of impaired hepatic excretion. Changes in bilirubin levels by various medicinal plant extracts have been widely reported^{22,23}. Significant reductions in serum bilirubin by plant extract were confirmed a number of workers^{24,25}, as well as insignificant increases in serum bilirubin²⁶.

Conclusion

While medicinal plants continue to gain acceptance as alternative medicines for healthcare delivery, efforts must continue to be intensified in screening such herbs to unmask any possible potential for toxicity, besides their efficacies in controlling some health challenges. The best approach would remain to scientifically isolate the active principles from their original source and incorporating same as ingredients in modern drugs. This is absolutely necessary since plant materials contain thousands of secondary metabolites, of which many may mask in them certain capacities that are yet not well defined or even not yet properly identified. In the light of this opinion, caution must continue to be advised and exercised in the administration and use of herbal materials in alternative medicine practice and drug researchers must intensify efforts to screen available herbal products to assist the teaming local dependants on these materials. *Sarcocephalus latifolius* root extract here studied is relatively safe and should not impact negatively on the liver with regard to the parameters investigated.

References

1. Enemor, V.H.A and Okaka, A.N.C., Sub-acute effects of ethanol extract of *Sarcocephalus latifolius* root on some physiologically important electrolytes in serum of normal wistar albino rats, *Pak. J. Biol. Sci.*, **16(23)**, 1811 – 1814 (2013)
2. Abbah, J.; Amos, S.; Chindoc, B; Ngazalc, I; Vongtaue, H.O.; Adzuc, B.; Faridad, T; Odutolad, A.A.; Wambebec, C.; and Gamaniel, K.S., Pharmacological evidence favouring the use of *Nauclea latifolia* in malaria ethnopharmacy: Effects against nociception, inflammation, and pyrexia in rats and mice, *J. Ethnopharmacol.*, **127**: 85–90 (2010)
3. Asase, A. and Mensah, G.O., Traditional antimalaria phytotherapy remedies in herbal markets in Southern Ghana, *J. Ethnopharmacol.*, **126(3)**: 492 – 499 (2009)
4. Gamaniel, K.; Wambebe, C.; Amupitan, J.; Hussaini, I.M.; mos, S.; Awodogan, A.; Dunah, A.W.; Ekuta, J.E.; Akeju, M.O.; Usman, H.; and Enwerem, N., Active column fractions of *Nauclea latifolia* on *Plasmodium berghei* and rabbit ileum, *J. Pharm. Res. Dev.*, **2**: 44–47(1997)
5. Ogunlana, E.O. and Ramstad, E., Investigation into the antibacterial activities of local plants, *Planta Medica* **27**: 354 (1975)
6. Madubunyi, I.I., Antihepatotoxic and trypanocidal activities of the ethanolic extract of *Nauclea latifolia* root bark, *J. Herbs, Spices, Med. Plants* **3**, 23–35 (1995)
7. Morah, F.N., Naucedal and epinaucedal from an antiviral preparation from *Nauclea latifolia*. *Glob. J. Pure App. Sci.*, **1**, 59–62 (1995)
8. Marshall, S.J.; Russell, P.F.; Philipson, J.D.; Kirby, G.C.; Warhurst, D.C.; and Weight, C.W., Antiplasmodial and antiamebic activities of medicinal plants from Sierra Leone, *Prostate*, **14**, 356–358 (2000)
9. Nworgu, Z.A.M.; Onwukaeme, D.N.; Afolayan, A.J.; Ameachina, F.C.; and Ayinde, B.A. Preliminary studies of blood pressure lowering effect of *Nauclea latifolia* in rats. *Afric. J. Pharm. Pharmacol.*, **2(2)**, 037 – 041 (2008)
10. Tona, L.; Kambu, K.; Mesia, K.; Cimanga, K.; Aspers, S.; Debruyne, T.; Pieters, L. and Totte, J., Biological screening of traditional preparations from some medicinal plants used as antidiarrhoeal in Kinshasa, Congo, *Phytomedicine*, **6 (1)**, 59-66 (1999)
11. Omer, M. E. A.; Al Magboul, A. Z.; and El Egami, A. A., Sudanese plants used in folkloric medicine: screening for antimicrobial activity, *Fitoterapia*, **69**, 542 – 545 (1998)
12. Amos, S.; Abba, J.; Chindo, B.; Edmond, I.; Binda, L.; Adzu, B.; Buhari, S.; Odutola, A.A.; Wambebe, C.; and Gamaniel, K., Neuropharmacological effects of the aqueous

- extract of *Nauclea latifolia* root bark in rats and mice, *J. Ethnopharmacol.*, **97** (1), 53 – 57 (2005)
13. Srivastav, N.; Pande, U.S.; Malik, G.K.; Singh, S.S.; and Singh, S.K., A study of serum bilirubin in neonates in relation to the maternal age, *Ind. J. Med. Sci.*, **53**, 158 – 61 (1999)
 14. Ghasi, S.; Ekwuibe, C.; Achukwu, P.U.; and Onyeanusi, J.C., Assessment of the medical benefit in the folkloric use of *Bryophyllum Pinnatum* leaf among the Igbos of Nigeria for the treatment of hypertension, *Afric. J. Pharm. Pharmacol.*, **5**(1): 83 – 92 (2011)
 15. Akah, P.A.; Offiah, V.N.; Onuogu, E., Hepatotoxic effect of *Azadirachta indica* leaf extract in rabbits, *Fitoterapia*, **63** (4), 311-319 (1991)
 16. Raju, S.M. and B. Mandala, Plasma enzymes in clinical practice. In: Illustrated Medical Biochemistry, (Ed.) Jaypee Brothers, Med. Publishers, Ltd., 195-197 (2005)
 17. Prohp, T.P. and Onoagbe, I.O., Anti - diabetic properties and toxicological studies of *triplochiton scleroxylon* on the heart enzymes in normal and streptozotocin - induced diabetic rabbits, *Pak. J. Nutr.*, **8** (7), 1025-1029 (2009)
 18. Lienou, C. T.; Etoa, F.X.; Nkegoum, B; Pieme,C.A.; and Dzeufiet, D.P.D., Acute and Subacute Toxicity of *Aspilia Africana* Leaves, *Afric. J. Trad. Compl. Alt. Med.*, **4**(2), 127 – 134 (2007)
 19. Vijayalakshmi, T; Muthulakshmi, V.; Sachdanandam, P., Toxic studies on biochemical parameters carried out in rats with Serankottai nei, a siddha drug–milk extract of *Semecarpus anacardium* nut, *J. Ethnopharmacol.*, **69**, 9 – 15 (2000)
 20. Balamurugan, K.; Kalaichelvan, V.K.; Anuradha, G.; MadhanaGopal, K.; Meganathan, M.; and Manavalan, R., Antifertility activity of methanolic extract of *Saccharum officinarum* Linn. (Leaves) on female albino rats, *Int. J. Pharm. Tech. Res.*, **1**(4), 1621 – 1624 (2009)
 21. Adhikary, P.; Banerji, J.; Choudhuri, D.; Das, A.K.; Deb, C.C.; Mukherjee, S.R. and Chatterjee, A., Antifertility effect of *Piper betle* Linn. extract on ovary and testes of Albino rats, *Ind. J. Exp. Biol.*, **27**, 868 – 870 (1989)
 22. Kolawole, O.T. and Kolawole, S.O., Effects of *Russelia equisetiformis* methanol and aqueous extracts on hepatic function indices, *Biol. Med.*, **2**(3), 38 – 41 (2010)
 23. Omonkhua, A.A. and onoagbe, I.O., Evaluation of the long-term effects of *urena lobata* root extracts on blood glucose and hepatic function of normal rabbits, *J. Toxicol. Environ. Health Sci.* **3**(8), 204 – 213 (2011)
 24. Takate, S.B.; Pokharkar, R.D.; Chopade,V.V.; and Gite, V.N., Hepato-protective activity of the ethyl acetate extract of *Launaea intybacea (jacq) beauv* in paracetamol induced hepato-toxicity in albino rats, *Int. J. Pharmaceut. Sci. Rev. Res.*, **1**(2). 72 – 74 (2010)
 25. Tsala, D.E.; Penlab, B.V.; Nnanga, N.; Mendimi, N. J.; Kouamouo, J.; Dimo,T., Protective activity of the stem bark methanol extract of *Alafia multiflora* against carbon tetrachloride-induced hepatotoxicity in rats, *Int. J. Pharmaceut. Sci. Rev. Res.*, **3**(2), 157 – 163 (2010)
 26. Nuhu, A.A. and Aliyu, R., Effects of *Cassia occidentalis* aqueous leaf extract on biochemical markers of tissue damage in rats, *Trop. J. Pharmaceut. Res.*, **7**(4), 1137 – 1142 (2008)