Original Research Article

Hepatoprotective potential of the aqueous leaf extract of *Telfairia occidentalis* on the Liver function parameters in Adult Wistar Rats

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**ABSTRACT**

Leafy vegetables are important items of diet in every home and a number of them are medicinal plants that have been used for curing diseases and have been documented in history of civilization. The current study was aimed at assessing the hepatoprotective potential of the aqueous leaf extract of *Telfairia occidentalis* (TO) on the Liver function parameters in Adult Wistar Rats. The sixteen rats used for this study were randomized into groups A, B, C and D. Rats in groups B, C and D were treated with 150, 300 and 600mg/kg.bwt of the leaf extract respectively by intubation for 28 days while group A served as control. Aspartate amino transferase (AST), alanine amino transferase (ALT), and alkaline phosphatase (ALP) activities were determined using standard laboratory methods. There was a significant reduction in mean body weight (p<0.05), and increase in serum activity of AST and ALP respectively (p<0.05), but there was no significant difference in the mean serum ALT activity (p>0.05) in the treated groups compared with control respectively. Therefore, it could be concluded that aqueous leaf extract of TO has hepatoprotective effect.

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1. Introduction

The use of plants as source as an adjust in the treatment of diseases can be traced back to the prehistoric times¹ and the acceptance of herbal remedy is increasing worldwide,² with medicinal herbs been increasingly studied by pharmacological researchers.³ This has lead to the use of herbs for therapeutic purposes such as headaches, cancer, liver diseases.⁴ Following the recent trends, medicinal plants would be the best source to obtain a variety of drugs. Therefore, such plants should be investigated for better understanding of their properties, safety and efficacy.⁵ Interestingly, a number of plant source have been shown to exhibit potential therapeutic effects on liver diseases and *Telfairia occidentalis* (TO) is one such plants to reckon with. TO is a popular vegetable cultivated widely in Nigeria and belongs to the family Cucurbitaceae.⁶ Phytochemically, it contains tannins, alkaloids, terpenoids, and flavanoids, saponins.⁷⁸⁹ This vegetable may sometimes contain a lot...
of heavy metals as a result of contamination by heavy metal pollutants. Amah et al. earlier documented the heavy metal contents of this vegetable in south eastern Nigeria.\textsuperscript{10} TO seems to have so much acclaimed benefits on health. It has been reported to have useful potentials in the management and amelioration of anemia,\textsuperscript{11–15} Diabetes,\textsuperscript{16–18} hyperlipidemia,\textsuperscript{19} Reproductive and fertility issues,\textsuperscript{20,21} and inflammatory conditions.\textsuperscript{22} [22] to mention only a few. A number of studies have shown the hepatoprotective potentials of TO\textsuperscript{23–28} in various countries including other parts of Nigeria but researches in this regards seems to be scanty in the South Eastern part of Nigeria and hence the study.

2. Materials and Methods

2.1. Study Site

This experiment was planned and executed in the Department of Human Anatomy, Nnamdi Azikiwe University, Nnewi, Nigeria.

2.2. Collection and Preparation

Fresh leaves of the plant (Telfairia occidentalis) were obtained locally from farms in Nnewi, Nigeria during the Month of June, 2018 and were air dried at room temperature, ground into fine powder devoid of unwanted particles in order to attain homogeneity. The powder was sieved using mesh sieves to remove any coarse or unwanted particles and afterwards stored in airtight plastic containers. The normal growers mesh, a product of Premier Feed Mills Co. Limited was used as the animal feed during the experimental period. Also, the plant leaf extract was weighed using a weighing balance to ensure standardization.

2.3. Experimental Animals, Study Design and Laboratory Methods

The current study was aimed at assessing the hepatoprotective potential of the aqueous leaf extract of Telfairia occidentalis(TO) on the Liver function parameters in Adult Wistar Rats. The sixteen rats used for this study were randomized into groups A, B, C and D. Rats in groups B, C and D were treated with 150, 300 and 600mg/kg.bwt of the leaf extract respectively by intubation for 28 days while group A served as control. All the experimental animals were weighed prior to the administration of the leaf extract and at day 29. The animal care and handling was conducted in accordance with standard regulations. Aspartate amino transferase (AST), alanine amino transferase (ALT), and alkaline phosphatase (ALP) activities were determined using standard laboratory methods. Blood samples for the evaluation of biochemical parameters (ALT, AST and ALP) were collected from the experimental animals into a plain container. ALT and AST estimation was done using the method by Reitman-Frankel,\textsuperscript{29} ALP was assayed according to the method by Mauro and Renze.\textsuperscript{30}

2.4. Data Analysis

The data obtained was presented as mean±SEM and the mean values of test groups were compared by ANOVA and Students t-test using SPSS Version 23 software. Statistical significance was tested at P<0.05.

3. Results

The results showed that the initial mean weight obtained in the control animals and those treated with 150mg/kg of T. occidentalis leaf extract did not differ significantly when compared with the respective corresponding values post treatment with T. occidentalis leaf extract (P>0.05). However, the experimental animals belonging to group B (300mg/kg) and C (600mg/kg) did show significant increases in the final mean weight when comparing the Initial weight respectively (P<0.05), Table 1.

| Group | Initial | Final | Mean (±SEM) | P-value | T-value |
|-------|---------|-------|-------------|---------|---------|
| A     | 210.00  | 220.00| 210.00 ± 30.00 | 0.423   | -1.000  |
| B     | 200.00  | 193.33| 200.00 ± 11.54 | 0.742   | 0.378   |
| C     | 127.50  | 150.00| 127.50 ± 9.46  | 0.037*  | -3.576  |
| D     | 135.00  | 150.00| 135.00 ± 11.90 | 0.014*  | -5.196  |

*Statistically significant at P<0.05.

The result showed that the mean activity of AST and ALP were significantly different amongst the group (F=23.444, 63.733) (P<0.05) respectively, whereas, ALT did not differ significantly amongst the group (F=2.488; P>0.05). The mean (±SEM) of serum AST (IU/L) activity in the experimental group treated with 150mg/Kg/ body weight of T. occidentalis leaf extract (Group B) was significantly decreased compared with control group (17.00±0.57 Vs 21.66±0.88; p=0.004). However, no significant mean difference was observed between the ALT value obtained in the control when compared with that of group B animals (P>0.05). There was a significant increase in the mean activity of AST in the experimental animals treated with 600mg/Kg T. occidentalis leaf extract (group D) in comparison with the control group (P=0.003).

The experimental animals in group B did not show any significant difference in the mean ALP activity when
Table 2: Effect of aqueous leaf extract of *Telfairia occidentalis* on AST, ALP and ALT of the liver after 28 days of treatment.

|                     | Group A (control) | Group B | Group C | Group D | Group A (control) | Group B | Group C | Group D |
|---------------------|-------------------|---------|---------|---------|-------------------|---------|---------|---------|
| Aspartate Transaminase (IU/L) | 21.66±0.88        | 17.00±0.57 | 21.33±0.88 | 26.66±0.88 | 116.66±0.88        | 130.00±5.77 | 278.00±12.70 | 397.66±30.31 |
| Alkaline Phosphatase (IU/L)       |                   |         |         |         |                   |         |         |         |
| Group B                        | 116.66±0.88       | 130.00±5.77 | 278.00±12.70 | 397.66±30.31 |                   |         |         |         |
| Group C                        | 116.66±0.88       | 130.00±5.77 | 278.00±12.70 | 397.66±30.31 |                   |         |         |         |
| Group D                        | 116.66±0.88       | 130.00±5.77 | 278.00±12.70 | 397.66±30.31 |                   |         |         |         |

*Statistically significant at P<0.05.

compared with control group (P>0.05), but those treated with 300mg/kg and 600mg/kg of the extract (group C and D) respectively were significantly increased in comparison with the control (group A) respectively (P<0.05). However, the mean serum levels of ALT (IU/L) did not differ significantly when compared between the groups respectively (P>0.05). See Table 2.

4. Discussion

The use of plants as source of remedies for the treatment diseases can be traced back to the prehistoric times.1,31 The choice of medicinal plants for therapeutic purposes seems to be on the rise. Therefore, such plants should be investigated for better understanding of their properties, safety and efficacy.5

In the present study, the results revealed that the experimental animals belonging to group B (300mg/kg), C (600mg/kg) and D (600mg/kg) showed significant decrease in the mean weight when compared with control animals respectively (P<0.05). This finding is in contrast with the work of Iweala and Obidoa,32 The health effect elicited through the consumption of a plant food is rooted in the concentration of its phytochemicals and nutritional constituents as well as the quantity of the plant constituent consumed.33 Therefore, it could be correct to infer that the weight loss experience by animals in this study was associated with the high doses of the extract administered to the experimental animals.

Findings from this study showed that there were significant increases in mean activity of AST and ALP in the TO treated animals than in control. This corroborates the report of Ekpenyong et al.[23] This increase in the mean levels of AST and ALP may be attributable to an extrahepatic origin rather than due to hepatobiliary effect, owing to the fact that they are produced from a number of other sites in the body order than the liver. However, several other similar studies are in contrast with the present finding.[24], [26-27].

In the present study, the mean serum activity of ALT did not differ significantly in the TO when compared with the control. This may be due to the hepatoprotective effect of *T. occidentalis*. This is in consonance with some previous similar studies which had earlier showed the ameliorative effect of *T. occidentalis* on the liver following its inducement with varied forms of hepatotoxins.[24-28]

5. Conclusion

In conclusion, the present study revealed a significant alterations in the mean body weight, mean serum AST and ALP activities with no significant alteration in serum ALT activity. Therefore, this study revealed the hepatoprotective effect of *T. occidentalis*.

6. Source of Funding

None.

7. Conflict of Interest

None.

References

1. Ankita S, Kaur P, Gupta R. Phytochemical screening and antimicrobial assay of various seeds extracts of CucurbitaceaeFamily. *Int J Appl Biol Pharm Technol*. 2012;3(3):9–409.
2. Inoue H, Yamazaki S, Shimizu M, Uozaki H, Goto T. Liver injury induced by the Japanese Herbal Drug Kamishoyosan. *Gastroenterol Hepatol*. 2011;7(10):692–4.
3. Sinclair S. Chinese herbs: a clinical review of Astragalus. 1998.;
4. Yuan HD, Jin GZ, Piao GC. Hepatoprotective effects of an active part from Artemisia sacrorum Ledeb. against acetaminophen-induced toxicity in mice. *J Ethnopharmacol*. 2010;127:528–33.
5. Nascimento GGF, Locatelli J, Freitas PC, Silva GL. Antibacterial activity of plant extracts and phytochemicals on antibiotic-resistant bacteria. *Br J Microbiol*. 2000;31(4):247–56.
some common Nigerian Vegetables.

Egwuatu FO. Hepatoprotective potential of the aqueous leaf extract of Telfairia occidentalis collected from eke ogiwe market. Int J Dev Res. 2018;7(1):42–7.

Alada AR. The haematological effect of Telfairia occidentalis diet preparation. Afr J Biomed Res. 2000;3:185–6.

Ajayi AI, Ajayi TC, Omoaro EU, Halim NK. Erythropoietic value of pumpkin leaf extract in rabbits - a preliminary study. Nigerian J Physiol Sci. 2003;18:35–42.

Nwauszoma AB, Dappa MS. Ethnobotanical Studies of Port Harcourt Metropolis, Nigeria. ISRN Botany. 2013;2013:1–11.

Verma KS, Baksh Z. Ethnobotanical Survey: Studies on Jhalpur District, Madhya Pradesh. J Res Devel. 2010;3(3):27–38.

Eze BC, Ezejindu DN, Ogbodo EC, Ezeugwunne IP, Amah AK, , et al. The effects of aqueous leaf extract of Telfairia occidentalis (fluted pumpkin) on some hematological parameters in adult female wistar rats. J Prev Med Holistic Health. 2020;5(2):106–9.

Eseyin OA, Ebong P, Ekpo A, Igbosoisoi A, Oforah E. Hypoglycemic Effect of the Seed Extract of Telfairia occidentalis in Rat. Pak J Biolog Sci. 2007;10(3):498–501.

Eseyin OA, Ebong P, Eyong E, Awosifayo O, Agboke A. Effect of Telfairia occidentalis on oral glucose tolerance in rats. African J Pharm Pharmacol. 2010;4(6):368–72.

Onokwco CO, Egesie GU, Maduka SO, Oguka VN. Hypoglycemic effect of aqueous extract of Telfairia occidentalis leaf extract in alloxan induced diabetic wistar rats. Am J Physiol, Biochem Pharmacol. 2018;7(1):42–7.

Adaramoye OA, Achem J, Akintayo OO, Fafunso MA. Hypolipidemic Effect of Telfairia occidentalis(Fluted Pumpkin) in Rats fed a Cholesterol-Rich Diet. J Med Food. 2010;10(2):330–6.

Nwangwa EK, Mordi J, Ebeye OA, Ojieh AE. Testicular regenerative effects induced by the extracts of Telfairia occidentalis in rats. Caderno de Pesquisa, série Biol. 2007;19:27–35.

Christopher S, Ejiohuhaner OS, Festus O. Profliferity effects of aqueous leaf extract of Telfairia occidentalis in adult male Wistar rats. J Exp Clin Anat. 2015;14(2):88–94.

Oluwole FS, Falode AO, Ogundipe OO. Anti-inflammatory effect of some common Nigerian Vegetables. Niger J Physiol Sci. 2003;18:35–8.

Ekenya CE, Akpan EE, Udoh NS. Phytochemistry and Toxicity Studies of <i>Telfairia Occidentalis</i> Aqueous Leaves Extract on Liver Biochemical Indices in Wistar Rats. Am J Med Sci. 2012;2(5):103–10.

Sabiu S, Wadli AM, Sunmonu TO. Combined Administration of Telfairia occidentalis and Vernonia amygdalina Leaf Powders Ameliorates Garlic-induced Hepatotoxicity in Wistar Rats. Pharmacol. 2014;5(5):191–8.

Jibril MM, Oluchi JO, Kabara HT, Amam AA, Muhammed YY, Abdullahi N. Effect of homogenates of avocado pear (<i>Persea americana</i>-<i>cv</i>/seeds and fluted pumpkin (<i>Telfairia occidentalis</i>-<i>cv</i>) leaves coadministered with anti-tuberculosis drugs on liver enzymes of albino rats. Bayero J Pure Appl Sci. 2016;8(2):187–91.

Toma I, Victory NC, Kabir Y. The effect of aqueous leaf extract of fluted pumpkin on some hematological parameters and liver enzymes in 2,4-dinitrophenylhydrazine- induced anemic rats. Afr J Biochem Res. 2015;9(7):95–8.

Oladele JO, Oyewole OL, Bello OK, Oladele OT. Hepatoprotective effect of aqueous extract of Telfairia occidentalis on cadmium chloride-induced oxidative stress and hepatotoxicity in rats. J Drug Desig Med Chem. 2017;3(3):32–6.

Ogunka-Nnoka C, Amagbe R, Amadi B, Amadi P. Biochemical Effects of Telfairia occidentalis Leaf Extracts against Copper-induced Oxidative Stress and Histopathological Abnormalities. J Adv Med. 2017;12(2):1–15.

Reitman S, Frankel S. A Colorimetric Method for the Determination of Serum Glutamic Oxalacetic and Glutamic Pyruvic Transaminases. Am J Clin Pathol. 1957;28(1):56–63.

Mauro P, Renze B. Enzymes: In the Tietz fundamentals of clinical chemistry. India Pp: Elsevier; 2013. p. 324–325.

Emeka EJI, Obidoa O. Some Biochemical, Haematological and Histological Responses to a Long Term Consumption of Telfairia occidentalis-Supplemented Diet in Rats. Pak J Nutr. 2009;8(8):1199–1203.

Saulu LC, Kpela T, Benebo AS, Oyewopo AO, Anifowope EO. The Dose-dependent testiculoprotective and testiculotoxic potentials of Telfairia occidentalis Hook f. leaves extract in rat. Int J Appl Res Nat Prod. 2010;3(3):27–38.

Eze BC, Ezejindu DN, Ogbodo EC, Ezeugwunne IP, Amah AK, Agada UN, et al. Histomorphological Effects of Aqueous Leaf Extract of Telfairia occidentalis On the Liver of Wistar Rats. Afr J Med All Sci. 2019;2(2):14–29.

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