Original Research Article

Histomorphological Effects of Aqueous Leaf Extract of *Tefairia occidentalis* On the Liver of Wistar Rats.


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**Article information:**

Received : June 2, 2019
Accepted : August 12, 2019
Published : August 31, 2019.
Doi: https://doi.org/10.33798/ajmas/2019/v01-2-2-00290.
Abstract

Aim: *Telfairia occidentalis* has been reported to possess numerous health benefits. This study assessed the histomorphological effect of aqueous leaf extract of *Telfairia occidentalis* on the liver architecture of wistar rats.

Methodology: Sixteen adult female rats weighing between 140-240g were divided into four groups (I-IV) comprising of four (4) rats each. Group I, the control, was given normal rat feed with water, while group II, III, and IV were administered with 150mg/kg, 300mg/kg and 600mg/kg body weight of aqueous leaf extract of *Telfairia occidentalis* orally respectively via intubation method for 28 days. Thereafter, the experimental animals were sacrificed and their respective liver harvested for histomorphological examination using haematoxylin and eosin (H and E) standard laboratory method.

Results: Results showed that there was a significant decrease in the relative weight of the liver in groups II-IV when compared to group I respectively (p<0.05). Photomicrographic section of the liver showed normal hepatic tissue architecture with central vain (CV), portal triad (PT) and hepatocyte (H) in the control animals while photomicrograph section of the liver administered with 150mg/kg aqueous extract of *Telfairia occidentalis* showed hepatic tissue with focal aggregate inflammatory cell (FAIC) and normal tissue architecture with portal triad (PT) but photomicrograph of liver administered with 300mg/kg and 600mg/kg aqueous extract of *Telfairia occidentalis* showed alterations.

Conclusion: This study revealed that the aqueous leaf extracts of *Telfairia occidentalis* may possess hepatoprotective effects although it may enhance some physiological changes such as mild hemolysis, infiltration of some inflammatory cells and intra-hepatic hemorrhage detected in this study.

Key Words: liver, histomorphology, *Telfairia occidentalis*, weight, hepatoprotective effect.
1.0 Introduction

The liver is the body’s largest single discrete internal organ. It has four major functions: metabolism and synthesis; excretion; storage; and the detoxification of potential poisons\[1\]. The liver is structurally and functionally complex and has been considered second only to brain in its complexity. At least 15 different cell types can be found in a normal liver. Hepatocytes are the most numerous and comprise 60% of the total cells and 80% of the volume of liver\[2\]. Although hepatocytes comprise almost 80% of the liver, there are at least another dozen cell types, many of which provide “cross-talk” and play important functional roles in the normal and diseased liver\[3\].

*Telfairia occidentalis* also known as fluted pumpkin is one of the most commonly consumed leafy vegetables in Nigeria, employed both for culinary and medicinal purposes\[4\]. The plant is grown in the rain forest zone of many nations of West Africa but occurs mostly in its cultivated form in various parts of southern Nigeria\[5\]. It is popularly called "ugu" in Igbo land and ikong-ubong in the Efik/Ibibio language, where the young shoots and leaves are the main ingredient of Nigerian edikang ikong soup\[6\]. *Telfairia occidentalis* is a darkish green leafy vegetable popularly used in soup and folk medicine for the management of many diseases in Nigeria\[7\]. *Telfairia occidentalis* which belongs to the family of cucurbitaceae, is a dioecious, perennial vine shrub and partially drought-tolerant\[8\]. The plant consists of a root, stem, leaves, fruit and seed. The stem has branching tendril, the leaves are divided into 3-5 leaflets, the fruits are pale green weighing between 3 and 10 kg and the seeds are 3-5 cm wide\[9\].

Fasuyi et al. reported that *Telfairia occidentalis* contains nutrients such as carbohydrates, proteins, vitamins, oils, minerals and fiber\[10\]. Phytochemical evaluation of the vegetable reveals that it contains oxalates, saponins, glycosides, flavonoids, alkaloids and resins\[11\]. The leaves of this vegetable are rich in minerals such as iron, potassium, sodium, phosphorus, calcium and
magnesium, and contain antioxidants such as thiamine, riboflavin, nicotinamide, ascorbic acid and amino acids such as alanine, aspartate glycine and leucine\[10\]. Owoade et al. reported the antioxidant and hepatoprotective activities of *Telfairia occidentalis* leaf extracts in carbon tetrachloride (CCl4)-induced oxidative stress and liver damage in rats, by increasing the decreased activities of superoxide dismutase (SOD), catalase (CAT), and reduced glutathione (GSH), and decreasing the elevated levels of malondialdehyde (MDA), alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP) and lactate dehydrogenase (LDH)\[12\]. They concluded that, the antioxidant and hepatoprotective activities observed in their study could be due to the polyphenolic contents of *Telfairia occidentalis* capable of absorbing, neutralizing and mopping up free radicals.

The toxicity of *Telfairia occidentalis* has been attributed to the alkaloids and saponins present in the roots and leaves\[11\], while the free radical scavenging activity, chemopreventive and protective effects of the plant have been reported to be due to the presence of high amount of flavonoids and phenolic compounds\[13\].

Emeka and Onyechi, observed in a study they carried out that the liver of rats fed with *Telfairia occidentalis* supplemented diet (TOSD) showed some irregularity possibly due to the presence of minute quantities of alkaloids in the leaves of *T. occidentalis* \[14\]. They also noted a slight distortion in the hepatic architecture of the animals fed with TOSD\[14\]. Hence, this study assessed the histomorphological effect of aqueous leaf extract of *Telfairia occidentalis* on the liver of wistar rats.

2.0 Materials and Methods

2.1 Location and Duration of the Study

This study was carried out in Animal House of Human Anatomy Department, Nnamdi Azikiwe University, Nnewi Campus, Anambra State, Nigeria. The rats were made to acclimatize for a period of one week after which the test substances were
administered for 28 days; the entire experiment lasted for four weeks.

2.2: Collection and Preparation

Fresh *Telfairia occidentalis* leaves were hand-picked randomly from different local farms in Nnewi, Anambra state of Nigeria in the Month of June, 2018. It was air dried at room temperature and was ground until a fine powder was obtained to ensure homogeneity. The powder was sieved through mesh sieves to remove any coarse/unwanted particles. The sieved powder was then stored in airtight plastic containers. The feed used was normal growers mesh produced a product of Premier Feed Mills Co. Limited. The weighing of the extract was done using a weighing balance.

2.3: Experimental Animals and Study Design

The research was done with 16 adult female wistar rats. The rats were bought from a local farm at Nnewi, Nigeria. They were housed in four standard cages and were divided into 4 groups (I to IV). The animals were provided with food and water *ad-libitum*. Prior to the commencement of the experiment, the animals were preconditioned for one week. The animal care and handling was conducted in compliance with the National Regulations for Animal Research. The group I, served as the Control group while group II, III, and IV served as the Test groups respectively.

2.4: Exposure of the Animals to Test Substance

The rats were weighed before the administration of the test substances commenced and thereafter weighed two weeks on Fridays of the week before feeding. The administration of aqueous *Telfairia occidentalis* (TO) leave extract was done as follows:

Group I-(Control) received only water and feed for four weeks
Group II received only 150mg/kg body weight of TO everyday for four weeks
Group III received only 300mg/kg body weight of TO everyday for four week
Group IV received only 600mg/kg body weight of TO everyday for four weeks
All administration was done with syringe and oral cannula.

2.5: Extraction of the organs

The rats were sacrificed after 28 days of administration, the liver was then harvested and put in a normal saline to maintain normal physiological conditions after which they were weighed and fixed in 10% formalin for histological processing.

2.6: Histopathological Examination

The liver tissues from each group of rats were collected in 10% formalin for 15 days. Thereafter, the well fixed tissues were processed, sectioned and stained following standard procedure\cite{15}. The histological evaluation of the effect of the aqueous leaf extract of *T. occidentalis* on the liver architecture of female adult wistar rats were done by microscopic examination of haematoxylin and eosin (H&E) stained sections.

2.7: Data Analysis

The data obtained was presented as mean±SEM and the mean values of the baseline and test groups were compared by one way analysis of variance (ANOVA) and Students t-test using Statistical package for social sciences (SPSS) (Version 23) software. Statistical significance was tested at P<0.05.

3.0 Results

Table 3.1: Effect of aqueous leaf extract of *Telfairia occidentalis* on relative liver weight after 28 days of treatment.

<table>
<thead>
<tr>
<th>Relative Liver weight (g)</th>
<th>MEAN±SEM</th>
<th>P-VALUE</th>
<th>F-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I (control)</td>
<td>4.43±0.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group II</td>
<td>2.82±0.04</td>
<td>0.000*</td>
<td>14.436</td>
</tr>
<tr>
<td>Group III</td>
<td>3.13±0.22</td>
<td>0.001*</td>
<td></td>
</tr>
<tr>
<td>Group IV</td>
<td>3.16±0.13</td>
<td>0.001*</td>
<td></td>
</tr>
</tbody>
</table>

*All data was analyzed using One-way ANOVA, followed by Post Hoc Fisher’s LSD multiple comparison. Data were considered significant at P<0.05.*
The result of analysis of variance showed that the mean relative weight of the liver were significantly different amongst the groups (F=14.436; p<0.05) respectively.

Result from the table above show that there was a decrease in the relative weight of the liver in group II (2.82±0.04), III (3.13±0.22) and IV (3.16±0.13) when compared to group I (4.43±0.26), the decrease in the relative weight of the liver was significant across the groups (p<0.05). See table 3.1 and Figure 3.1.

Figure 3.1: Bar chart shows the effect of aqueous leaf extract of Telfairia occidentalis on relative liver weight.
3.2 Histopathological findings

Plate 3.2 (Control): A Photomicrograph section of the liver shows normal hepatic tissue architecture with central vein (CV), portal triad (PT) and hepatocyte (H). Stained by H & E Technique (x150).
Plate 3.2 (Group II): A Photomicrograph section of the liver administered with 150mg/kg aqueous extract of *Telfairia occidentalis* shows hepatic tissue with focal aggregate inflammatory cell (FAIC) and normal tissue architecture with portal triad (PT). Stained by H & E technique (x150).
Plate 3. 3 (Group III). A Section of Photomicrograph of liver administered with 300mg/kg aqueous extract of *Telfairia occidentalis* shows hepatic tissue with focal aggregate inflammatory cell (FAIC), focal area of intra hepatic hemorrhage (FAIHH). Stained by H & E Technique (X 150).
Plate 3. 4 (Group IV). A Photomicrograph of section of liver administered with 600mg/kg aqueous extract of *Telfairia occidentalis* shows hepatic tissue with mild infiltrate of inflammatory cell (MIIC), mild distortions hepatic tissue (MDHT) and congestion of the central vain (CCV) otherwise normal. Stained by H & E technique (X 150).

4. Discussion

*Telfairia occidentalis* leaves and seeds are widely consumed due to its potential health benefits\textsuperscript{[16]}. In the present study, there were significant decreases in the relative weight of the liver in animals in group II to IV when compared to control animals. The
mechanism behind this decrease in the mean organ weight is not quite clear to us. Perhaps, an active principle contained in the plant may be responsible for this effect. This finding is in contrast with the report of some previous similar studies\cite{17-18}.

From the observed result, histological analysis of the liver of the rats in group I (control) showed normal hepatic tissue architecture with central vein, portal triad and hepatocyte. Animals in group II (150mg/kg), showed hepatic tissue with focal aggregate inflammatory cell (FAIC) and normal tissue architecture with the portal triad. However, animals in group III (300mg/kg), showed hepatic tissue with focal aggregate inflammatory cell (FAIC) and focal area of intra hepatic haemorrhage whereas, animals in group IV (600mg/kg), showed hepatic tissue with mild infiltration of inflammatory cell (MIIC), mild distortion of hepatic tissue and congestion of the central vein.

The present study results are congruent with the works of de Oliveira et al.\cite{19} and Delmas et al.\cite{20}. Their work supported the fact that most of the phytochemical constituents of *Telfairia occidentalis* are not hepatotoxic, but could enhance some other physiological changes like mild haemolysis as detected in this study. These physiological changes, although mild, could be as a result of variable factors which may be due to its active ingredients, over dose, prolonged use/abuse, coexisting disease and idiosyncratic reactions like allergy, hepatitis and anaphylaxis which could account for these unusual effects. However, the present finding is not in keeping with the previous report of Akindele et al.\cite{17}.

**Conclusion**

The result of this study indicates that the aqueous leaf extracts of *Telfairia occidentalis* may possess hepatoprotective effects although it may enhance some other physiological changes such as mild hemolysis, infiltration of some inflammatory cells and intra-hepatic hemorrhage as detected in this study. These physiological changes, although mild, could be as a result of variable factors.

**Competing interests:** None declared.
Authors’ contributions:
This work was carried out and approved in collaboration between all the authors. DNE, BCE, IPE designed the study; BCE sourced for funding; ECO, IPE wrote the protocol; ECO, IPE, FOE, DCE, CN, AKA contributed in literature search; BCE, DNE did the experiments; AKA, DUPM, IOO, FOE did statistical analysis; ECO, DCE, CN, DUPM drafted the manuscript; DNE supervised the study; ECO, IPE, IOO, FOE Wrote the final manuscript; DCE, CN, AKA, DUPM, IOO proofread the manuscript.

References


How to cite this article
