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Evaluation of the Effect of Ethanol Seed Extract of *Telfairia. occidentalis* on the Hepatic Health of Diabetic Rats.

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ABSTRACT

The aim of this study was to evaluate the effect of ethanol seed extract of *Telfairia. occidentalis* on the activity of liver enzymes in diabetic rats. Freshly harvested seed of T. occidentalis was processed into extract. Twenty (25) adult male wistar rats were divided into five (5) groups of five rats each. **Group I** was fed normal rat chow and water only, **Group II** was diabetic; untreated rats, **Groups III** and **IV** were diabetic; treated with 150 mg/kg and 250 mg/kg extract of *T. occidentalis* seed. The activity of the serum hepatomarkers (Aspartate transaminase, Alanine amino transaminase and Alkaline phosphatase) evaluated was significantly ($P<0.05$) high which was reversed in a dose dependent manner. In conclusion, it has been unveiled through this study that *T. occidentalis* seed extract has the potential to improve hepatic health.

ARTICLE DETAILS

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Introduction

Physiologically, the liver is saddled with critical life sustaining tasks [1] which include metabolism and detoxification of xenobiotics which when lost may translate to death [2]. Diabetes mellitus (DM) is a common progressive disease which occurs when the Beta-cells of the pancreas loses its ability to produce insulin and or resists insulin [3]. The concerted effort of enhanced oxidative stress and aberrant inflammatory response constitute the mechanism of diabetes induced hepatic damage which activates the transcription of pro-apoptotic genes and consequent damage to the hepatocytes [4].

In recent years, plants have received much attention as a local instrument of therapeutic significance believed to be relatively safe for human and animal use and their use in the treatment of diabetes mellitus is not an exception. *Telfairia occidentalis* locally called ugu by the people of the South-Eastern Nigeria is a member of the *Curcurbitaceae* family [5]. Its leaf is rich in antioxidants and has been reported to have hepatoprotective, anti in-flammatory and immune boosting properties [6] among others. Although the seed produced by the gourd has been found to be rich in protein and fat and has been employed in the treatment of diabetes mellitus [7], there is paucity of data on whether or not its anti-diabetic potential will translate to improved hepatic health.

MATERIALS AND METHODS

Plant Material

Fresh and mature pods of *T. occidentalis* were bought from a local market in Nasarawa Local Govenment Area of Nasarawa state, Nigeria. The pods were sliced open and the seed removed and washed. The seed coat was removed and the endosperm dried at room temperature before being ground to fine powder. The seed powder was soaked in 96% ethanol for 2 hr. The extract obtained was filtered and concentrated with a rotary evaporator. The brownish residue obtained was dried in desiccators.

Animals

Adult male wistar rats weighing between 150-250 g were procured from the animal house of Department of Biochemistry, University of Jos. The rats were kept and maintained in well ventilated cages under standard laboratory conditions and were allowed unrestricted access to food and water. They were allowed to acclimatize to the laboratory conditions for two weeks before the experiment.

Median Lethal dose 50% (LD50)

To determine the acute toxicity of extract, three groups of three wistar rats each were involved. The various groups were separately administered with 10, 100 and 1000 mg/kg of extract orally. The rats were observed for 24 hr for signs of toxicity. In the absence of death in any of the groups, another three groups of one rat each was each administered orally with 1600, 2900 and 5000 mg/kg of extract separately. The animals were observed for 48 hr for signs of toxicity Lorke [8].

Animal Grouping

A total of 25 rats divided into 5 groups of 5 rats each were used in this study.

Group 1:Non diabetic without treatment. (Normal control)

Group 2: Diabetic rats without treatment (Negative control)

Group 3:Diabetic rats treated with 100 mg/kg .bw *T. occidentalis* seed extract.

Group 4:Diabetic rats treated with 250 mg/kg .bw *T. occidentalis* seed extract.

Group 5: Diabetic rats treated with 2.5 mg/kg Metformin daily.

Induction of Diabetes

Diabetes mellitus was induced by single intraperitoneal injection of 120 mg/kg body weight of alloxan [9]. Three days afterwards, the blood sugar level was determined with the aid of a glucometer (Acc-cheek Advantage Roche diagnostics GmbH, Germany) and the rats with fasting blood glucose level more than 126 mg/dl (11.1mmol/L) were considered diabetic hence selected for the study.

Biochemical Analysis

Rats were orally administered with *T. occidentalis* seed extract for 14 days after which the rats were fasted overnight, anesthetized with chloroform before being sacrificed 24 hour after the last treatment. Blood sample was collected and used to assay for AST, ALT and ALP.

Liver Function Test (LFT)

Blood sample was centrifuged at 3000 rpm for 10 min. The obtained clear serum was used for measuring the levels of ALT, AST and ALP using commercially available kits according to the standard procedures [10]

Statistical Analysis

Data generated were expressed as Mean ± Standard Deviation using SPSS (Ver. 23). Data were analysed using one way Analysis of Variance (ANOVA). Differences in mean were compared using Turkey Test. *p-values* less than 0.05 was considered statistically significant.

Table 1: Effect of *T. occidentalis* Extract on the Activity of Liver Enzymes in Diabetic rats

GROUPING	TREATMENT	AST (U/I)	ALT(U/I)	ALP(U/I)
Group I	Normal control	20.66 ± 0.06^{a}	36.81 ± 1.03^{a}	57.67 ± 4.33^{a}
Group II	Diabetic; untreated	26.64 ± 1.33^{d}	42.00 ± 1.53^{c}	71.00 ± 2.08^{c}
Group III	Diabetic+100 mg/kg extract	21.33 ± 0.66^{b}	40.33 ± 1.45^{b}	65.67 ± 1.76^{bc}
Group IV	Diabetic+250 mg/kg extract	22.00 ± 1.15^{c}	41.67 ± 0.88^{b}	63.33 ± 6.23^{b}
Group V	Diabetic+ STD drug	22.00 ± 1.15^{c}	37.67 ± 0.88^{ab}	58.00 ± 2.08^{ab}

Results are expressed as mean ± standard deviation of three determinations. Values with the different superscript in a column are significantly ($P<0.05$) different.

RESULT AND DISCUSSION

It has been revealed through research that diabetes mellitus is linked to liver dysfunction characterized by elevated serum level of serum hepatomarkers [11] and insulin resistance as well as compensatory hyperinsulinaemia have been implicated [12]. Table 1 shows the effect of ethanol extract of *T. occidentalis* seed on the activity of liver enzymes in diabetic rats. The activity of aspartate transaminase in diabetic; untreated rats was significantly ($P<0.05$) high (26.00±133 U/I). However, this was significantly ($P<0.05$) reduced to (21.33±0.66 U/I) and 22.00±1.15 U/I) following oral administration of 100 mg/kg and 250 mg/kg of *T. occidentalis* seed extract respectively. Similarly, the activity of Alanine transaminase (ALT) was significantly ($P<0.05$) high in diabetic rats, this was significantly ($P<0.05$) reduced following oral administration of extract in a dose dependent manner. Evidently, the activity of alkaline phosphatase (ALP) was significantly ($P<0.05$) raised in diabetic rats (Group II) (71.00±2.08 U/I). This was significantly ($P<0.05$) reduced in a dose dependent manner (65.67±1.76U/I) and (63.33±6.23 U/I) with 100 mg/kg and 250 mg/kg of *T. occidentalis* seed extract respectively. The decreased activity of the serum hepatomarkers in diabetic rats administered with *T. occidentalis* seed extract could be as a result of the anti-diabetic property of *T. occidentalis* seed evident by the finding of Olorunfemi et al. [7].

CONCLUSION

This study has demonstrated the potential of *Telfairia occidentalis* seed extract to improve hepatic health.

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