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Biochemical Effects of the Seed Extract of *Telfairia occidentalis* in Rats

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Abstract: Effect of the ethanol extract of seed of *Telfairia occidentalis* in rat was evaluated. 100, 250, 500 and 1000 mg kg⁻¹ of the extract was orally administered daily to four different groups of Wistar albino rats (127±13 g) for 28 days. The fifth group of rats (i.e., control) received saline water only. On the 29th day blood was collected from the overnight fasted rats through cardiac puncture under chloroform anaesthesia. Appropriate commercial (Randox^R) kits were used to analyze the blood serum for the following enzymes and biomolecules: Aspartatetransaminase (ASAT), alaninetransaminases (ALAT), alkaline phosphatase, total cholesterol, High density lipoproteins (HDL), Triglyceride (TG), creatinine, total proteins, total and conjugated bilirubin and glucose. The extract significantly increased the serum levels of total cholesterol, total proteins, total bilirubin, conjugated bilirubin and glucose; but decreased the levels of HDL.

Key words: *Telfairia occidentalis*, biochemical parameters, seed extract

INTRODUCTION

Telfairia occidentalis popularly referred to as fluted pumpkin is a member of the Curcubitaceae family. The plant is extensively cultivated in southern Nigeria and some parts of West Africa mainly for its nutritional value (Akoroda, 1990). It has however been established that the plant also has medicinal value. The plant is known to possess the following activities: anti-inflammatory (Oluwole *et al.*, 2003), antibacterial (Odoemena and Essien, 1995), erythropoietic (Ajayi *et al.*, 2000), hypoglycaemic (Eseyin *et al.*, 2000; Eseyin *et al.*, 2005; Aderibigbe *et al.*, 1999; Nwozo *et al.*, 2004), anticholesterolemia and enhanced production of α - and γ - globulin (Eseyin *et al.*, 2005b). The seeds are highly nutritious and are roasted or boiled and eaten like the seeds of breadfruit (*Treculia*); they are also sometimes used as soup thickeners (Okoli and Mgbeogu, 1983). The seed is very rich in oil, especially unsaturated fatty acids which form 61% of the oil (Odoemena and Onyeneke, 1998). This research was undertaken to evaluate how the seed affects some key biomolecules with a view to ascertaining the safety or otherwise of the seed.

MATERIALS AND METHODS

Plant material and preparation of extract: Fresh mature pods of *Telfairia occidentalis* were obtained from the

medicinal plant garden of the Faculty of Pharmacy, University of Uyo, Nigeria in June 2005. The pods were sliced open and the seeds removed and the endosperm ground with a homogeniser. The extract was filtered and concentrated *in vacuo*. The brownish residue obtained was dried to a constant weight in a dessicator.

Administration of extract to animals: Twenty five Wistar albino rats of both sexes weighing 127±13 g obtained from the animal house of the University of Uyo were used. The rats had free access to water and standard pelleted rat feeds. They were kept under the care of trained animal technicians and approval for this work was given by the Animal Ethics Committee of the University of Uyo. The 25 rats were divided into five equal groups and fasted overnight after which groups 1, 2, 3, 4 and 5 were orally administered with 100, 250, 500 and 1000 mg kg⁻¹ of the extract and saline water, respectively once daily for 28 days.

Blood processing and determination of biomolecules:

On the evening of the 28th day the rats were fasted overnight. On day 29, the blood was drawn from the hearts of the rats under chloroform anaesthesia. The blood obtained was allowed to clot and centrifuged to obtain serum. Appropriate commercial kits (Randox Laboratories, United Kingdom) was used to evaluate the serum levels of aspartate and alanine

transaminases (ALAT and ASAT), alkaline phosphatase, total cholesterol, total proteins, total and conjugated bilirubin, High Density Lipoproteins (HDL), Triglycerides (TG), creatinine and glucose:

Glucose: This was evaluated using the glucose oxidase method.

Alanine transaminase (ALAT): The method involves the monitoring of the concentration of pyruvate hydrazone formed with 2, 4-einitrophenyl hydrazine.

Aspartate aminotransferase (ASAT): The principle of the method used involved monitoring the concentration of oxaloacetate hydrazone formed with 2, 4-dinitrophenyl hydrazine.

Alkaline phosphatase (Phenolphthalein monophosphate method): This method is based on the principle that serum alkaline phosphatase hydrolyzes a colourless substrate of phenolphthalein that results in phosphoric acid and phenolphthalein at alkaline pH values. The pinkly coloured product is measured colorimetrically at 550 nm.

Triglycerides: This involves the enzymatic colorimetric test of glycerol phosphate oxidase method.

Total cholesterol: This was carried out by the enzymatic colorimetric chod-PAP method.

HDL-cholesterol: High Density Lipoprotein (HDL) separated from chylomicrons. Very Low Density Lipoproteins (VLDL) and Low Density Lipoproteins (LSL) by the addition of a phosphotungstic and magnesium chloride (precipitating reagent) to the serum. After centrifugation, the cholesterol content was determined by the enzymatic colorimetric method.

LDL and VLDL cholesterol: These were calculated as recommended above.

Total protein: This was done using the Biuret method.

Creatinine: Modified Jaffe's method was used. Creatinine which is a hydride of creatine reacts with alkaline sodium picrate to form a red complex which can be determined photometrically.

Total and conjugated bilirubin: This was based on colorimetric method

Statistical analysis: Data were expressed as Mean±SEM and were analyzed by two way ANOVA and Scheffe's post test. $p < 0.05$ was taken as significant.

RESULTS AND DISCUSSION

As could be observed from Table 1, the concentration of total cholesterol at the dose levels of 100, 250, 500 and 1000 mg kg⁻¹ were 4.8092, 4.526, 4.7984 and 4.8614 mmol L⁻¹, respectively. These values are significantly higher from the control (4.262 mmol L⁻¹). The extract at 100, 250, 500 and 1000 mg kg⁻¹ doses also significantly increased the concentration of total proteins from the control value of 49.402 to 62.722, 66.881, 66.808 and 66.45 g L⁻¹, respectively. 100 mg kg⁻¹ dose did not significantly affect HDL, but 250 and 1000 mg kg⁻¹ reduced HDL significantly from 1.422 (control) to 1.1234 and 1.1016 mmol L⁻¹, respectively. The values of total and conjugated bilirubin are significantly higher than control.

Hyperproteinemia could be caused by pachyhememia resulting from loss of liquid or some chronic inflammatory process elicited by antibody formation (e.g., rheumatism and polyarthritis). The hyperproteinemic effect of the seed of *T. occidentalis* might have arisen through any of the above factors. Hyperbilirubinemia is caused by overproduction of more bilirubin, failure of damaged liver to excrete bilirubin or obstruction to the excretory ducts of normal liver. The hyperbilirubinemic effect of the extract may therefore be due to overdegradation of hemoglobin, ineffective erythropoiesis, or biliary obstruction. Liver

Table 1: Effect of the seed extract of *Telfaria occidentalis* on some biochemical parameters

Parameters	1000 mg kg ⁻¹	500 mg kg ⁻¹	250 mg kg ⁻¹	100 mg kg ⁻¹	Control
Total cholesterol (mmol L ⁻¹)	4.8614±0.1207*	4.7984±0.1838*	4.526±0.3785*	4.8092±0.2523*	4.262±0.2137
HDL (mmol L ⁻¹)	1.1016±0.2292*	1.5852±0.2406*	1.1234±0.2068*	1.2448±0.1139	1.422±0.1118
ASAT (U L ⁻¹)	23.2±5.38	15.6±2.06	18.0±4.29	21.4±8.14	18.0±3.35
ALAT (U L ⁻¹)	19.8±9.68	27.8±1.60	17.4±6.22	28.6±6.22	22.2±8.33
Creatinine (mmol L ⁻¹)	102.0±41.1	101.8±22.7	97.2±14.8	69.0±22.2	126.4±49.7
Total proteins (g L ⁻¹)	66.45±0.98*	66.81±3.01*	66.88±2.05*	62.72±2.17*	49.40±1.41
Total bilirubin (U mol ⁻¹ L ⁻¹)	19.351±6.08*	14.294±5.23*	10.323±2.33	7.400±3.65*	13.026±1.20
Conjugated bilirubin (U L ⁻¹)	20.91±9.90*	15.218±7.86*	9.45±3.10*	5.068±2.64	3.986±0.63
Alkaline phosphatase (U L ⁻¹)	23.30±2.91*	26.25±2.56	28.46±3.80	26.96±5.27	27.20±1.60
Triglyceride (mmol L ⁻¹)	1.6262±0.121	1.9442±0.135	1.616±0.172	1.8216±0.181	1.578±0.1666
Glucose (mg dL ⁻¹)	44.4±4.36*	41.6±1.20	38.2±3.66	46.0±4.15*	37.4±3.83

Mean±SEM, * $p < 0.05$, n = 5

damage is not suspected here because this is not indicated by the values of ALAT and ASAT. Since the commonest cause of elevated serum level of conjugated bilirubin is biliary obstruction, it does appear that the extract might have caused this. The seed of *T. occidentalis* is known to be rich in oil. This may be responsible for the high level of cholesterol observed.

In conclusion, the hyperproteinemic and hyperbilirubinemic effects of the seed extract of *T. occidentalis* indicate that daily, long-term consumption of the seed may be detrimental to health.

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