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Effects of the Fruit of *Telfairia occidentalis* on Some Biomolecules in Rat

[1]Olorunfemi A. Eseyin, [2]Arit Ekpo, [2]Iboro Idem, [1]Arnold C. Igboasoiyi and [1]Edoho J. Edoho
[1]Department of Pharmaceutical and Medicinal Chemistry, Faculty of Pharmacy,
University of Uyo, Nigeria
[2]Department of Biochemistry, College of Health Sciences, University of Uyo, Nigeria

Abstract: The effects of the ethanolic fruit extract of *T. occidentalis* on some enzymes and biochemical parameters were evaluated in rats. 100, 500 and 1000 mg kg^{-1} of the extract were administered orally and once daily to three different groups of rats, respectively, for 28 days. The fourth group which served as control received distilled water only. On the 29th day, the rats which had been fasted overnight were dissected under chloroform anaesthesia and blood was collected directly from their hearts. The blood was allowed to clot and centrifuged to obtain the serum which was kept in a refrigerator at -4°C until used for analysis. Appropriate Commercial kits (Randox Laboratories, UK) were used to evaluate the serum activity or concentration of the following parameters:alamine and aspartate transaminases, alkaline phosphatase, cholesterol, triglycerides, creatinine, high density lipoproteins, total and conjugated bilirubin and total proteins. The fruit extract of the plant significantly elevated the serum concentrations of cholesterol, triglycerides, total proteins, at the three dose levels. The 500 and 1000 mg kg^{-1} doses increased the concentrations of HDL and conjugated bilirubin. While only 100 and 500 mg kg^{-1} doses of the extract reduced the level of total bilirubin. The hypercholesterolemic, hyperproteinemic, hypertriglyceridemic and hyper conjugated bilirubinemic effect of this extract coupled with the increased activity of alkaline phosphatase suggest that the fruit of *Telfaira occidentalis* may not be safe for consumption. This is quite contrary to the nutritional usage of the leaf and seed of this plant.

Key words: *Telfairia occidentalis*, fruit, enzymes, biochemical parameters, biomolecules

INTRODUCTION

Telfairia occidentalis commonly known as fluted pumpkin is also known as fluted gourd, Costillada (Spanish), Krobonko (Ghana) and Gonugbe (Sierra Leone). The plant belongs to the Cucurbitaceae family and is cultivated across lowland humid tropics of West Africa-Nigeria, Ghana, Sierra Leone-mainly for its nutritional value (Axtell, 1992). The leaves are eaten as vegetables while the seeds are either roasted or ground for other food preparations. Apart from the nutritional (Okoli and Hgbeogu., 1983), agricultural and industrial importance (Akoroda, 1990), the plant is also medicinally useful. It possesses anti-inflammatory (Oluwole *et al*., 2003), antibacterial (Odoemena and Essien, 1995), erythropoietic (Ajayi *et al.,* 2000), anticholesterolemic (Eseyin *et al*., 2005a) and antidiabetic (Eseyin *et al*., 2000, 2005b) activities.

The fruits of *T. occidentalis* are among the largest known. The ripe fruit contains up to 13% oil. While various investigations have been carried out in the leaf stem, seed and root of this plant, very little research has been done on the fruit. This research is therefore an attempt to kickstartresearches on the fruit of *Telfairia occidentalis* so as to explore its medicinal value.

MATERIALS AND METHODS

Plant collection and extraction: The fruits of *Telfairia occidentalis* were obtained from the Medicinal Plant Farm of the Faculty of Pharmacy, University of Uyo, Nigeria. The fruits were sliced open and the pulp and seeds evacuaed. The fruits were then chopped into small bits. Four liters of 96% ethanol was poured into a container containing 2.5 kg of the fruit material and left for 72 h. The extract was filtered and concentrated *in vacuo*. The residue was dried in a desiccator.

Administration of extract to animals: Twenty Wilstar albino rats of both sexes obtained from the animal houde of the University of Uyo were used. The rats had free access to water and standard pelletised feed and they

Corresponding Author: Olorunfemi A. Eseyin, Department of Pharmaceutical and Medicinal Chemistry, Faculty of Pharmacy, University of Uyo, Nigeria Tel: 08023291687

were kept in the care of experienced animal technicians. Prior to the administration of extract, the rats were fasted overnight. They were divide into four equal groups. 100, 500 and 1000 mg kg^{-1} of the fruit extract was orally administered once daily for 28 days to groups 1, 2 and 3, respectively. While group 4 (control) received distilled water only instead of the extract.

Collection of blood: On the 29th day, blood was collected from the heart of the overnight fasted rats under chloroform anaesthesia. The blood collected was allowed to clot and centrifuged to obtain the serum. The blood serum was kept in a refrigerator at 0-4°C until it was used.

Estimation of biomolecules: Appropriate commercials kits (Randox Laboratories, UK) were used to determine the concentrations of alanine and aspartate transaminases. (ALAT and ASAT): alkaline phosphatase, cholesterol, Triglycerides, creatinine, High Density Lipoproteins (HDL), total and conjugated bilirubin and total proteins.

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.

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 described by Jendrassik and Grof.

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

RESULTS AND DISCUSSION

As could be seen from Table 1 100, 500 and 1000 mg kg^{-1} of the extract significantly elevated the serum concentration of cholesterol (5.5916, 6.3156 and 5.9772 mmol L^{-1}) , Triglycerides (1.9132, 1.7824 and 1.8308 mmol L^{-1}) , total proteins (64.424, 65.168 and 67.868 mmol L^{-1}) and alkaline phosphatase (34.0, 33.6 and 35.6 U L^{-1}). HDL was elevated significantly only by 1000 mg kg^{-1} dose (1.802 mmol L^{-1}), conjugated bilirubin by 500 and 1000 mg kg^{-1} doses (6.74 and 21.09 mmol L^{-1}, respectively). Only the 100 and 500 mg kg^{-1} doses significantly reduced serum level of total bilirubin (i.e., 8.07 and 7.40 mmol L^{-1}) compared to control (13.03 mmmol L^{-1}). It is obvious from the above data that the fruit extract caused hypercholesterolemia, hypertriglyceridemia and increased alkaline phosphatase level.

Hyperproteinemia could be caused by pachyhemia resulting from loss of liquid or some chronic inflammatory process elicited by antibody formation (e.g., rheumatism and polyarthritis). The hyperproteinemic effect of the fruit 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 over degradation of hemoglobin, ineffective erythropoiesis, or biliary obstruction. High cholesterol level may also occur in affected liver, signifying that the extract might have had a damaging effect on liver function. 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 *T. occidentalis*. The observe elevated serum level of alkaline phosphatase is an indication that the extract might have caused some bone disorders or hyperthyroidism (Whitby *et al*., 1984).

It could therefore be concluded that the fruit extract had a damaging effect on the rat liver and bones and may therefore not be safe for consumption for a prolonged

Table 1: Effects of the fruit extract of *Telfairia occidentalis* on some biochemical parameters in rat

Biomolecules	Control	1000 (mg kg^{-1})	500 (mg kg^{-1})	100 mg kg^{-1})	F
Cholesterol (mmol L^{-1})	4.262±0.214	5.9772±0.139*	6.3156±0.205*	5.5916±0.562	39.70
Triglycerides (mmol L^{-1})	1.578±0.166	1.8308±0.0356*	1.7824±0.0557*	1.9132±0.0949*	8.34
Creatinine (mmol L^{-1})	126.4±49.67	65.2±18.0	112.2±39.19	81.6±38.2	2.21
ALAT (U L^{-1})	22.2±8.033	19.4±7.90	28.2±1.60	25.0±5.06	1.70
ASAT (U L^{-1})	18.0±3.35	22.0±4.38	18.0±3.35	21.6±5.20	1.47
HDL (mg kg^{-1})	1.422±0.118	1.802±1.55*	1.314±0.136	1.566±0.228	7.54
Total bilirubin (Umol L^{-1})	13.026±1.997	19.31±8.33	7.40±1.74*	8.07±3.33*	5.16
Conjugated bilirubin (Umol L^{-1})	3.986±0.63	21.09±10.09*	6.74±2.11*	5.965±3.159	7.76
Total proteins (g L^{-1})	49.402±1.112	67.868±1.89*	65.168±3.229*	64.424±3.70*	51.55
Alkaline phosphatase (U L^{-1})	27.2±1.60	35.6±1.019*	33.6±2.87*	34.0±2.83*	11.85

Mean±SEM, n = 5, $p<0.05$

period, except probably at very low dose. Research on *T. occidentalis* has so far been focused on the leaf and seed of the plant. This study is perhaps the first of its kind to be undertaken on the fruit of *T. occidentalis*.

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