

EFFECTS OF EXTRACTS OF *TELFAIRIA OCCIDENTALIS* LEAVES ON SOME BIOCHEMICAL PARAMETERS IN RAT.

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ABSTRACT

Ethanol extract of the leaf of *Telfairea occidentalis* was orally administered to wistar rats for 14 days. On the 15th day the rats were sacrificed and blood was taken from their hearts for analysis. The levels of proteins, hemoglobin, protein fractions, glucose, cholesterol, alanine transaminase (ALAT) and aspartate transaminase (ASAT) were determined. The objective of the study was to investigate some claims made by herbal practitioners that the leaf of the plant is used in management or treatment of ailments such as cholesterolemia, liver problems, anaemia etc.

The leaf extract lowered the levels of cholesterol, ASAT and ALAT activities, β -globulin, albumin, albumin/globulin quotient, but increased the levels of total proteins, α -globulins, and Y-globulins. The results of this work showed that the use of the leaf extract in the treatment of cholesterolemia, liver problems and impaired immune/defence system is justifiable.

KEYWORDS: *Telfaria occidentalis*, medicinal plant, protein fraction, alanine – and aspartate-transaminase

INTRODUCTION

Telfaria Occidentalis popularly called fluted pumpkin is a member of the Cucurbitaceae family. It is widely cultivated in the south Eastern part of Nigeria and some parts of Ghana because of its edible leaves and seeds (Johnson et al, 1979; Jeffery, 1980; Burkhill, 1979 Bosa E. O. et al, 1983). The other species, *Telfairia pedata* (sims) Hooker is commonly found in East Africa and is used in the treatment of stomach troubles, rheumatism, as galactagogue e.t.c. (Watt et al, 1962). The nutritive (Oyenuga V.A, 1968; Sofowora, 1986), hypoglycaemic (Eseyin, O.A, 2000) antibacterial (Odoemena et al, 1995), erythropoietic (Ajayi et al, 2000) uses of the plant have been reported. Herbal medical practitioners claim that the leaves of *T. occidentalis* are medicinally important. Juice obtained from the leaves is used to purify the blood-stream, in the management of stress, hypertension, cancer, cholesterolemia, arthritis, lowered immune activities, all cases of anaemia and premature aging (Elizabeth K, 1998 and Godwin Ihesie, 2000). These claims have not been scientifically ascertained. The objective of this work is to stimulate scientific investigation of the aforementioned claims. The effect of long term administration of the leaf extract of this plant on some biomolecules of diagnostic value is reported.

EXPERIMENTAL DESIGN

EXTRACTION

Fresh leaves of *T. Occidentalis* were collected from the botanical garden of faculty of Pharmacy, University of Uyo and Voucher Specimen was deposited in the same Faculty. 500g of the leaves were washed,

cut into smaller bits and ground with mortar and pestle. The leaf material was extracted with 500ml 96% ethanol in a soxhlet apparatus. The solvent is removed in vacuo and the residue dried in a desiccator.

ADMINISTRATION OF EXTRACT

20 wistar rats ($140 \pm 41.74g$) were divided into two groups of 10 rats each. Group A was orally given saline (2ml) while group B received 2ml extract (500mg/kg) orally for 14 days daily. All animals in both groups had free access to water and standard animal feed throughout the 14 day period.

COLLECTION OF BLOOD

All the rats were fasted overnight on the 14th day. On the 15th day they were all sacrificed and blood was collected directly from their hearts for analysis.

BLOOD ANALYSIS

Hemoglobin (in whole blood), albumin, glucose, cholesterol, alanine transaminase (ALAT), and Aspartate transaminase (ASAT) in serum were all determined using Randox kits (Randox laboratories Ltd, U. K.) While total protein was determined spectrophotometrically and protein fraction was determined turbidimetrically according to the method outlined by E. A. Stroev and V. G. Makarova.

Spectrophotometric method for determination of serum protein: 9.9ml of sodium chloride solution was added to 0.1ml of serum in a test tube. Absorbance of the mixture was measured against the control sodium chloride solution on UV spectrophotometer (Unicam 8700 series) at two wavelengths, 260 and 280nm, using 1cm cells.

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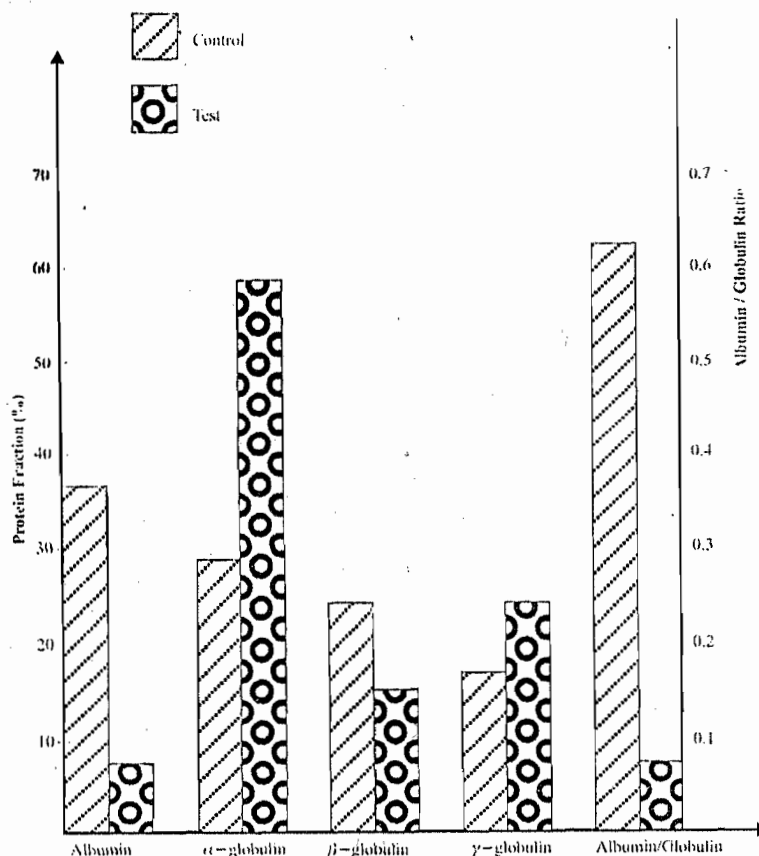


Figure 1: Effect on Extract on Protein Fraction

According to Calcar's empirical formula, protein concentration (g/L) = 1.45 E₂₈₀ - 0.74 E₂₆₀.

Determination of Protein Fraction concentration in serum By the Turbidimetric Method:- Six test-tubes were numbered 0-5. 10ml of distilled water was transferred to tube 0 (control) and 5ml of corresponding phosphate buffer working solutions (1-4) were added into tubes 1-4. 0.5ml of blood serum, 0.74 ml distilled water, and 3.75ml of phosphate buffer stock solution were added to tube 5 and mixed thoroughly. 1ml of mixture in tube 5 was added to the tube 0 (control), and 0.5ml to each of the tubes 1-4. the contents were stirred. After 15 minutes, the turbidity (absorbance) was measured for solution Nos 1 - 4 against tube 0 (control) at 620nm using 1cm thick cells. Protein fractions were calculated as follows:

- Albumins E = E1 - E2
- (α-globulins E = E2 - E3
- B-globulins E = E3 - E4
- Y-globulins E = E4

The obtained absorbance value for each protein fraction (i.e E1, E2, E3 and E4) were summed up and taken conventionally as 100% (i.e E total). The

concentration X for each fraction (in %) was determined by the formula:

$$X = \frac{E \text{ fraction} \times 100\%}{E \text{ total}}$$

RESULTS

The results obtained are shown in tables I, II and III. Figure I displays the results for protein fractions graphically.

Table 1: Effects of extract on the concentrations of hemoglobin, albumin, total proteins, glucose and cholesterol.

	Control (n=10)	Test (n=10)
Hemoglobin (g/dL)	9.25 ± 0.66	10.28 ± 1.71
Total protein (g/L)	0.684±0.156	0.730±0.043 *
Albumin (g/dl)	3.553±0.497	3.6658±0.498*
Cholesterol (mg/dl)	150.40± 18.0	72.14±12.81
Glucose (mg/dl)	14.94±1.59	13.38±2.033

* P < 0.05

mean ± SD

Table 2: Effects of extract on activities of ASAT and ALAT

	Control (n=10)	Test (n=10)
ALAT	17.207± 8.39	15.948± 0.9397 *
ASAT	22.33± 8.39	21.75±6.95
ASAT / ALAT	1.2977	1.3638

* P < .05. mean ± SD

Table 3: Effect of extract on protein fractions

	Control n=10	Test n=10
Albumin (%)	38.08±10.51	4.59± 0.24*
α-globulin (%)	29.03±7.77	58.09±3.57*
β-globulin (%)	22.30±5.69	12.02±5.04 *
γ-globulin(%)	10.39±1.96	22.09±7.53 *
Albumin/Globulin	0.6548±0.295	0.0496±0.00529*

* P < .05.

DISCUSSION AND CONCLUSION

The results show that the levels of cholesterol, total proteins, protein fractions, albumin/globulin quotient and ALAT of test animals were significantly different from those of control animals. Hyperproteinemia occurs in relatively rare occasions such as in pachyhemias (usually produced by a loss of liquid) and certain chronic inflammatory processes engendered by antibody formation e.g. in rheumatism and polyarthritis. The normal proteinogram is also altered in disease states. Decreased concentration of albumins and an increased concentration of γ-globulins (as observed in this work, Figure 1) is indicative of an acute inflammatory process. Lowering of albumin level with concomitant relative increase in γ-globulins (which was also observed) could also indicate liver problems such as hepatitis and cirrhosis.

In myocardial infarction the activity of ASAT is higher than that of ALAT, with attendant increase in ASAT/ALAT quotient. While in liver problems, ALAT activity increases simultaneously with decrease in ASAT/ALAT quotient.

The results of this work seem to suggest that some inflammatory processes might have been triggered off by the ingestion of the leaf extract. Higher level of protein in the test animal may therefore be as a result of the production of anti-bodies. This suggestion is reinforced by the protein fraction pattern in which the albumin level is significantly lower in the test animal with simultaneously higher level of α-globulin. The observed pattern of ASAT and ALAT activities does not support liver problems as suggested by the protein fraction pattern. Rather the lower level of these enzymes in the test animals may be a sign of a beneficial effect of the extract on the liver. Various antibodies or immune bodies developed against the many kinds of antigens are found in the γ-globulin fraction, the higher level of

γ-globulin in the test animals could therefore be taken as an indication of better immune system in the test animals. While the observed lowering of cholesterol level in test animals is confirmatory of the claims made to this effect by herbal practitioners, the observed increase in level of haemoglobin in test animals is not significant at P < .05.

In conclusion, this work gives a preliminary justification for the use of the leaf extract of this plant in the management of cholesterolemia, liver problems and impaired defence/immune system. However, the drastic decrease in albumin level in the test animal may have untoward consequences if certain drugs are administered simultaneously with the extract. This is because albumin play significant role in the transportation of drugs and other substances in the blood stream.

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