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### Studies on the Biochemical Effects of *Talinum triangulare* in Rat

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**Abstract:** Ethanol extract of *Talinum triangulare* was administered parenterally to Wistar albino rats weighing 144-179 g daily for a period of twenty eight days at four dose levels: 100, 250, 500 and 1000 mg kg<sup>-1</sup>. Control group received saline water only in place of the extract. The rats were fasted overnight after extract administration on the 28th day. On the 29th day the rats were dissected under chloroform anaesthesia and blood collected by cardiac puncture. Serum was obtained from the blood by centrifugation after clotting. The concentration of the following enzymes and biomolecules were determined from the serum using appropriate commercial kit (Randox R, United Kingdom): Alanine and aspartate aminotransferases, alkaline phosphatases, total cholesterol, high density lipoproteins, triglycerides, creatinine, total proteins, total and conjugated bilirubin and glucose. The extract significantly reduced the concentration of creatinine to 105.0, 94.20, 100.20 and 82.00 mmol L<sup>-1</sup> from control level of 134.44 mmol L<sup>-1</sup> and increased glucose concentration to 81.0, 76.8, 82.0 and 72.8 mg dL<sup>-1</sup> compared to control at all dose levels (100, 250, 500 and 1000 mg kg<sup>-1</sup>, respectively). Changes in concentration of all the other biomolecules were insignificant at p<0.05. The results showed that *Talinum triangulare* possesses hemolytic and hyperglycemic effect and should therefore be consumed with caution by diabetic patients.

**Key words:** *Talinum triangulare*, biomolecules, enzymes, hyperglycemic, bilirubinemia

### INTRODUCTION

*Talinum triangulare* is a succulent herb from the family Portulacaceae. It is popularly known as water leaf, mainly because of its high moisture content (Herrera, 1999). The plant is widely cultivated in West Africa, Asia and South America. The plant contains cardioglycosides, flavonoids and polyphenols. The moisture content of the plant is 90.8%. It contains 2.4, 0.4, 4.4 g kg<sup>-1</sup> of proteins, total fats and total carbohydrate, respectively (Fasuyi, 2006).

*T. triangulare* is edible and has nutritive value (Folarin *et al.*, 2001). There are claims that the plant also possesses medicinal value. It has been credited with curing of internal heat, measles and some sexually transmitted diseases. It has prooxidant activity (Iwalewa *et al.*, 2005) and antiinflammatory effect (Oluwole, 2003). It can also be used as a tonic (Udo *et al.*, 1993).

This work was undertaken to evaluate the effect of the consumption of *T. triangulare* on some enzymes and biomolecules and to assess the safety or otherwise of the plant for its nutritive and medicinal use.

### MATERIALS AND METHODS

#### Plant Collection

Fresh plant of *T. triangulare* were collected from the University of Uyo (Nigeria) medicinal gardens in March 2005. The plant was identified in Pharmacognosy Department of the same

University. The leaves were cut into small bits and soaked in 96% ethanol for 72 h. The extract was filtered and concentrated *in vacuo*. The residue obtained was kept in a dessicator until when used.

#### **Experimental Animals**

Twenty five wistar albino rats of both sexes weighing 144-179 g were used. The rats were purchased from and kept in the animal house of the University of Uyo under the care of experienced animal technicians. The rats had free access to water and standard palletized animal feed.

#### **Administration of Extract**

The twenty five rats were divided equally into 5 groups: A, B, C, D and E. The plant extract was administered orally to the rats once daily for 28 days. Group A which served as control received water only. While groups B-E received 100, 250, 500 and 1000 mg kg<sup>-1</sup> of the extract, respectively. The weight of the rats were taken on days 1, 8, 15 and 28 (i.e., week 1, 2, 3 and 4).

#### **Collection of Blood**

On the 29th day, the overnight fasted rats were anaesthetized with chloroform, dissected and blood was collected directly from the heart.

#### **Processing of Blood**

The blood samples obtained were allowed to clot and were centrifuged at 7000 rpm for 10 min to obtain the blood serum. The serum was stored in a refrigerator at 4°C until when needed for analysis.

#### **Estimation of Enzymes and Biomolecules**

Appropriate commercial kits (Randox Laboratories, United Kingdom) were used to evaluate the serum level of the following molecules: Aspartate and alanine transaminases, alkaline phosphatase, total cholesterol, triglycerides, high density lipoproteins, total bilirubin, conjugated bilirubin, creatinine and glucose.

#### **Glucose**

This was evaluated using the glucose oxidase method (Trinder, 1969).

#### **Alanine Transaminase (ALAT)**

The method involves the monitoring of the concentration of pyruvate hydrazone formed with 2,4-dinitrophenyl hydrazine (Rietman and Frankel, 1957).

#### **Aspartate Aminotransferase (ASAT)**

The principle of the method used involved monitoring the concentration of oxaloacetate hydrazone formed with 2,4,-dinitrophenyl hydrazine (Rietman and Frankel, 1957).

#### **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 (Zoppi and Fellini, 1976).

### **Total Cholesterol**

This was carried out by the enzymatic colorimetric chod-PAP method (Zoppi and Fellini, 1976).

### **HDL-Cholesterol**

High Density Lipoprotein (HDL) separated from chylomicrons. Very Low Density Lipoproteins (VLDL) and Low Density Lipoproteins (LDL) 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 (Zoppi and Fellini, 1976).

### **Total Protein**

This was done using the Biuret method.

### **Creatinine**

Modified Jaffe's method (1886) 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 (Jendrassik and Groff, 1938).

### **Statistical Analysis**

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

## **RESULTS AND DISCUSSION**

The results of the effects of the extract of *T. triangulare* on the various biomolecules are shown on Table 1. From the table, of all the parameters evaluated, only the levels of creatinine, total bilirubin and glucose were significantly affected by the extract compared to control. The extract increased serum glucose concentration at all dose levels (81.0, 76.8, 82.0, 72.8 mg dL<sup>-1</sup> at 100, 250, 500, 1000 mg kg<sup>-1</sup>, respectively) as compared to that of control rats (47.00). The increase is not dose dependent. The reason for the hyperglycemic activity of this extract is not known. But it is possible that the extract decreased the release of insulin, stimulated release of glucagons or made the animals less sensitive to insulin.

The extract of *T. triangulare* also significantly reduced the serum levels of creatinine. While control rats had creatinine concentration of 134.44; doses of 100, 250, 500 and

Table 1: Effect of *T. triangulare* on the concentration of some enzymes and biomolecules in rat

Biomolecules	100 mg kg <sup>-1</sup>	250 mg kg <sup>-1</sup>	500 mg kg <sup>-1</sup>	1000 mg kg <sup>-1</sup>	Control
Aspartate aminotransferases (UL <sup>-1</sup> )	18.25±6.50	17.60±2.24	20.00±1.90	18.20±2.40	17.60±2.24
Alanine aminotransferases (U L <sup>-1</sup> )	13.00±0.01	12.00±1.55	13.00±0.01	13.00±0.01	13.00±0.01
Alkaline Phosphatases (U L <sup>-1</sup> )	29.90±4.39	28.91±3.27	27.61±3.12	29.10±3.14	30.81±1.62
Cholesterol (mmol L <sup>-1</sup> )	4.78±0.31	5.23±4.94	5.09±2.80	4.67±0.12	5.03±0.49
Triglycerides (mmol L <sup>-1</sup> )	1.76±0.17	1.92±0.14	1.91±0.06	1.90±0.29	1.84±0.08
High density Lipoproteins (mmol L <sup>-1</sup> )	1.15±0.18	1.14±0.24	1.06±0.20	1.01±0.17	1.14±0.07
Total Proteins (g L <sup>-1</sup> )	69.34±0.82	65.26±1.39	66.30±1.96	65.38±3.75	67.74±4.96
Creatinine (mmol L <sup>-1</sup> )	105.00±12.19*	94.20±9.02*	100.20±27.99*	82.00±28.82*	134.40± 27.39
Total Bilirubin (Umole L <sup>-1</sup> )	18.08±11.49*	17.75±7.34*	13.91±6.91	14.84±5.05	10.40±9.53
Conjugated Bilirubin (Umole L <sup>-1</sup> )	14.71±12.76	14.71±8.73	7.77±6.88	7.48±6.08	6.10±1.31
Glucose (mg dL <sup>-1</sup> )	81.00±13.38*	76.80±13.31*	82.00±10.83*	72.80±12.07*c	47.00±2.61

Mean±SEM n = 5 \* $p < 0.05$

1000 mg kg<sup>-1</sup> of the extract reduced creatinine level to 105.00, 94.20, 100.20 and 82.00 mmol L<sup>-1</sup>, respectively. Increased level of creatinine is indicative of kidney disease (Annino and Giese, 1976). The results therefore indicated that the extract did not exert a harmful effect on the kidney.

The lower doses of the extract (100 and 250 mg kg<sup>-1</sup>) significantly increased the serum level of total bilirubin. Hyperbilirubinemia may be due to overproduction of bilirubin or to failure of its excretion and is seen in numerous diseases, ranging from hemolytic anaemias to viral hepatitis and to cancer of the pancreas (Robbert, 2000). It therefore seem that the extract of *T. triangulare* might have one way or the other caused hemolysis in the animal. Why higher dose of the extract did not exert this effect is not known. As stated in the introduction, *T. triangulare* contains cardioglycosides, flavonoids, polyphenols and other bioactive components. The observed effect of this plant may therefore be attributable to one or more of these constituents. However, further work needs to be done to unravel this.

The results of this study show that the extract of *T. triangulare* possesses hemolytic and hyperglycemic effects, suggesting that it may not be safe for a diabetic patient to consume the plant without medical supervision.

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