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Effect of *Saccharum barberi* on the total serum protein and serum albumin in Albino wistar rats and Guinea pigs

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ABSTRACT

The effect of *Saccharum barberi* on total serum protein and serum albumin in albino wistar rats and Guinea pigs were determined. An ethanolic extract of saccharum barberi was made. Twenty (20) Albino wistar rats and twenty Guinea pigs of both male and female were used for the experiment. The albino wistar rats and Guinea pigs were divided into four groups (A – D), each group made up of five (5) animals Group A is the control while B, C, D were the test animals. The test animal were given a dose level of 100mg/kg, 200mg/kg and 300mg/kg body weight respectively from the prepared crude ethanolic extract of saccharum barberi for a period of twenty one (21) days. The blood sample of each animal (Albino wistar rats and Guinea pigs) were taken and the total serum protein determined by Biuret method while the serum albumin was determined using the Bromocresol green method. The results shows that the saccharum barberi has the effect of lowering the total serum protein and the serum albumin, although more pronounced in the albino wistar rats than the Guinea pigs. It is equally dose dependent. The saccharum barberi could be used in treating ailments that is caused by excess protein.

Keywords: *Saccharum barberi*, albino rats, bromocresol, biuret method, wister rats and guinea pigs

INTRODUCTION

Serum proteins and serum albumins are made up of enzymes, hormones, antibodies clotting agents etc which play a major function of transport of materials, regulators, osmotic pressure, immunity, act as building blocks and reservoir of energy in tissues and cells (Gibbon, 2002).

The vital roles of this proteins make them important biomarkers for any substance that will affect their concentration in the body fluid either at elevated level or reduced level, a situation that could invoke diverse diseases (Smith et al. 2005; Hawkins and Dugaiezyk, 2002; Harper and Dugaiezyk, 2003).

The present research was aimed at finding out the effect of the plant saccharum barberi on total serum protein and serum albumin in albino wistar rats and Guinea pigs. Saccharum barberi was found to have a reductive effect on the level of total serum protein and serum albumin in albino wistar rats and Guinea pigs. *Saccharum barberi* belongs to the family of poaceae and the genus saccharum is about 3 – 5m tall and 2 – 3cm width and has spiral alternative leaves and mostly found in the rainforest area of the world. The plant had been used as medicinal plant right from ancient periods (Duke 1978, Hayashi, et al. 1993, and Begun, 2002).

Materials and Methods

Plant material

Fresh *Saccharum barberi* were obtained from Magongo in Ogori/Magongo L.G.A. of Kogi State, Nigeria with identification and authentication was done by Mr. Patrick Ekwonoh of the Botany Department of Kogi State University, Anyigba.

Assay Kit

The assay for total serum protein and serum albumin was carried out using the Gornal et al. 1949. biuret method and the Bromocresol green method of Marcphason and Evarald, 1972.

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Experimental animals

Twenty (20) both male and female albino rats and twenty (20) both male and female Guinea pigs were obtained from the animal house of the Department of Biochemistry, Kogi State University, Anyigba. The animal were allowed to acclimatized for seven days. Each rat was housed in a wooden cage. The animal room was well ventilated and kept at room temperature and relative humidity of 30±02 and 75% respectively with 12 hours natural light – dark cycle. The experimental animals were allowed free access to standard feed and water. Good hygiene was maintained by constant cleaning and removal of faeces and spilled feeds from cages daily.

Preparation of ethanolic extract of *Saccharum barberi*.

The stems of the Saccharum barberi were obtained washed with water to remove the debris. Sharp knife was used to remove the hard bark and chopped into smaller pieces. The chopped pieces was sun dried for two weeks in front of the Biochemistry Laboratory for two weeks in the month of October at relative humidity of 65%.

The dried Saccharum barberi were pounded using mortar and pestle and grinded into powdery form using a grinding mill model of binatone product of Germany.

A quantity, 350g of the powdered Saccharum barberi stem was weighed and macerated into 250ml of 80% ethanol in a stopped flask. The content was vigorously shaken and left to stand for 72 hours for the solvent to interact with the plant material. The mixture was passed through muslin cloth to separate the filtrate from the plant residue. The filtrate was evaporated using a rotary evaporator to obtain a 20g crude extract sample which represent a 5.7% yield. The crude extract was used for the determination of the total serum protein and serum albumin in albino Wistar rats and Guinea pigs.

Animal grouping and Administration of extract.

Twenty (20) male and female albino wistar rats were picked at random and placed in a wooden cages labeled A–D.

Five albino wistar of both male and female albino wistar rats each per cage with group labeled A serving as the control while B, C and D were the test group. The same division was carried out for the Guinea pigs.

From the stock solution of extract, 2.0g of the crude extract was dissolve in 100ml of distilled water to give a solution which corresponds to 20mg/ml. The amount and dosage corresponding to 100mg/kg, 200mg/kg and 300mg/kg body weight were administered to the experimental animals (Albino wistar rats and Guinea pigs) using the oral incubator method for a period of twenty – one (21) days.

Collection of blood samples

Blood was collected from all the test animals and control animals by cardiac puncture under chloroform anaesthesia. Two samples were collected in test tube for each animal (Albino wistar rats and Guinea pigs). The blood samples was spinned at 5000 rpm for 5 minutes to separate serum from the blood cells. The serum obtained was used for the determination of total serum protein and serum albumin.

Determination of total serum protein (Gornal *et al.*, 1949)

Biuret reagent, biuret working solution, Tartaric and solution and standard protein were prepared using standard procedure. Five test tubes were set at room temperature for 10 minutes. The absorbance was at 540 nm, setting the zero with the blank.

	Test	Test blank	Standard	Standard blank	Blank
Working burette reagent	0.05 ml	-	0.05ml	-	0.05 ml
Tartaric acid solution	-	0.05 ml	-	0.05ml	-
Serum (sample)	0.05 ml	0.05 ml	-	-	-
Standard	-	-	0.05ml	0.05ml	-
Distilled water	-	-	-	-	0.05 ml

Total serum protein in mg/d =

$$\frac{\text{Ab Test - Ab Test blank}}{\text{Ab standard - Ab standard blank}} \text{ X Concentration of the standard}$$

Determination of serum albumin (Marcphaso n and Evarald, 1972):

Serum albumin binds to Bromocresol green to form a green complexes, the absorbance of which is taken at 640nm (red filter). Standard albumin, Bromocresol green and blank reagents were prepared by standard procedure. Three test tubes were set up, the content were mixed well and allowed to stand at ambient temperature and absorbance taken at 640nm.

	Test	Standard	Blank
BCG reagent	0.05ml	0.05ml	-
Blank reagent	-	-	0.05ml
Serum (sample)	0.05ml	-	-
Standard	-	0.05ml	-
Distilled water	-	-	0.05ml

Gram of serum albumin in mg/d =

$$\frac{\text{Ab Test}}{\text{Ab standard}} \text{ X Concentration of standard}$$

Statistical Analysis:

Data were presented as mean ± SD of five determinants. A further comparison of the control and the test groups for both animals were carried out.

RESULTS

Table-1: Effect of *Saccharum barberi* extract Administration on total serum protein and serum albumin in Albino wistar rats

Group	Mean value in (g/dl) for total serum protein	Mean value in (g/dl) for serum Albumin
A (control)	7.01±0.46	2.81±0.18
B (100mg/kg)	6.49±0.31	2.23±0.07
C (200mg/kg)	6.10±0.14	2.10±0.05
D (300mg/kg)	5.64±0.39	1.94±0.13

Values represent mean ± SD (n = 10) at (p<0.05)

Table-2: Effect of *Saccharum barberi* extract Administration on total serum protein and serum albumin in the Guinea pigs

Group	Mean value in (g/dl) for total serum protein	Mean value in (g/dl) for serum Albumin
A (control)	8.00±0.61	3.81±0.11
B (100mg/kg)	7.50±0.17	3.46±0.19
C (200mg/kg)	7.12±0.20	3.10±0.08
D (300mg/kg)	6.65±0.18	2.94±0.10

Values represent mean ± SD (n = 10) at (p<0.05)

Table-3. Comparative effect of *Saccharum barberi* extract administration for total serum protein in albino wistar rats and Guinea pigs

Albino wistar rats	Deviation	Guinea pigs	Deviation
A : B	0.52	A : B	0.48
7.01 : 6.39		2.81 : 2.33	
A : C	0.91	A : C	0.71
7.01 : 6.1		2.81 :2.10	
A : D	1.37	A : D	0.87
7.01 : 5.64		2.81 :1.94	

Table-4. Comparative effect of *Saccharum barberi* extract administration on serum albumin in albino wistar rats and Guinea pigs

Albino wistar rats	Deviation	Guinea pigs	Deviation
A : B	0.50	A : B	0.35
8.00 : 7.50		3.81 : 3.46	
A : C	0.88	A : C	0.71
8.00 : 7.12		3.81 : 310	
A : D	1.35	A : D	0.87
8.00 : 6.65		3.81 : 2.94	

DISCUSSION

The effect of extract of saccharum barberi is seen to be more intense in Albino wistar rats than Guinea pigs from the values obtained in table I and Table II above for total serum protein and serum albumin. However, there is a general trend of decreased in total serum protein and serum albumin as the concentration of extract administered increase and hence purely dose dependent.

The decrease is significant at $p<0.05$ for the extract. The extract act by decreasing the synthesis of protein the liver. The comparison of experimental animals of the control group (A) with other groups (B,C and D) indicate that the differences increases as the dose level increases for total serum protein and serum albumin for both the albino wistar rats and Guinea pigs.

This is of clinical important as the extract from this plant could be used to control diseases associated with excess protein. The extract could reduce the consumption of food in animals leading to decrease protein intake. It could also reduce synthesis of protein by the liver, leading to a lowering values for total serum protein and serum albumin.

Several other conditions of ill-health could also result to decrease protein such dehydration, malnutrition, kidney diseases asthma cancer etc (Doumas and Biggs 2002, Smith *et al*., 2005).

Conflict of Interests

Authors declare that there is no conflict of interests regarding the publication of this paper.

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