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Proximate nutrient composition of *Saccharum barberi* powdered stem extract (dry matter)

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ABSTRACT

Proximate composition of powdered stem of Saccharum barberi and body weight indices of Albino wistar rats was investigated after 21 days of extract administration. Forty albino wistar rats of male sex were randomly assigned into four study groups of ten animals each to give in all four study groups of male wistar rats respectively. Graded doses of the alcoholic extracts 100mg/kg, 200mg/kg and 300mg/kg body weight in normal saline were administered to the treatment groups II, III and IV via orogastric tube; the control group I received placebo (normal saline) for 21 days. At the end of 21days period, the experiments were terminated. The proximate analysis showed carbohydrates, moisture and fibre at high concentration. The microelement determination indicated presence of calcium, magnesium and phosphorus at high concentration compared to others; Zinc, Sodium, Iron, Manganese and Potassium respectively.

Keywords: proximate composition, body weight and microelements

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INTRODUCTION

Life, health, disease and decay are inseparable from man and hence man has sought to fight and control disease and pain, with the use of plants and animals in their environment. Armed with this innate curiosity and desire to examine by trial and error, all aspect of his environment, he has been able to establish which materials are remedial, harmful or give him the greatest comfort [1]. The growing interest in the use of traditional medicine vis-à-vis the growth of several unorthodox drug industries has led to much interest in the scientific evaluation of medicinal plants, including the toxicity risks associated with them. Investigations into the chemical and biological activities of these plants in the past two centuries have yielded a lot of bioactive agents used for the development of modern drugs [2].

Saccharum barberi which belongs to the family of Poaceae and the genus *Saccharum* is about 3-5m tall and 2-3cm width. It has spiral alternate leaves and is a monocotyledon. *Saccharum barberi* is mostly found in the rainforest

area of the world; Malaysia, India, China, Nigeria. The plant *Saccharum barberi* is known by Yoruba – Ereke Obo Esun, Ibo-Okpoto, Igala–Okpete and Hausa-Hiiki Teiwa [3]. The extracts of *Saccharum barberi* exhibited anti-dote, antiseptic, antiviral, intoxicant, bactericidal, cardiotoxic, diuretic, laxative and demulcent properties [4]. These properties had made the plant *Saccharum barberi* useful in the treatment of the following ailments: bedsores, ulcer, cancer, malaria, cold, cough dysentery, diarrhea, skin burn, spleen tumor [5].

Medicinal plants had been used in the treatment of various disease states. Ephedrine from ephedra plant is used in treatment of asthma and other respiratory disease. Extract from Neem plant is used in treatment of malaria while extract from Aloe vera had been used in treatment of ulcer and cancer [6]. Medicinal plants become very relevant in the face of poverty. In peasant communities, many people are poor and cannot afford the modern form of treatment, since it is very expensive [7].

MATERIALS AND METHODS

Fresh stems of *Saccharum barberi* were obtained from Magongo in Ogori Magongo L.G.A. of Kogi State and Abejukolo in Omala L.G.A. of Kogi State respectively. The plant was identified by Late Mr. Patrick Ekwonoh of Botany Department of Kogi State University, Anyiagba, while voucher specimens of this plant were retained in the herbarium unit of the department.

The stems of the *Saccharum barberi* were washed thoroughly with water to remove the debris. The sharp knife was used to peel off the hard bark and then chopped into smaller pieces. The chopped pieces of the *Saccharum barberi* were sun dried for two weeks in front of Biochemistry Laboratory in the month of October, 2010 with relative humidity of 60%. The dried *Saccharum barberi* stems were pounded using a mortar and pestle, into small bits and further crushed into powdery form. Moreover, 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 to allow the solvent interact with plant material. The mixture was passed through muslin cloth to separate the filtrate from plant residue. The filtrate was concentrated in a rotary evaporator to obtain a 20g crude extract which represent a 5.7% yield. The extract obtained was used for phytochemical and quantitative screening in animal studies.

Experimental Design and Extract Administration

Forty male Albino wistar rats were aged between 10–12 weeks and weighed between 130–170g were reared in animal house of Biochemistry Department, Kogi State University, Anyigba. Prior to experimentation, the animals were acclimatized for seven days before the experiment and maintained ad–libitum on water and growers mash (Pfizer feed, Lokoja), obtained from Anyigba market. The Experimental animals were kept at ambient temperature of 26^{o}c, with adequate ventilation and a natural 12 hour day –light cycle, in animal house facility of Department of Biochemistry, Kogi State University, Anyigba, and were housed in locally fabricated modern cages. The cages were constructed locally, with planks and iron nets with dimension of 2ft long and 1ft by width and height respectively. Each cage contained ten animals Albino Wistar rats, thus representing one group each.

The *Saccharum barberi* extract of 20g obtained which represent a yield of 5.7% was used to prepare a solution in distilled water. Moreover, 2g of crude extract was dissolve in 100ml of distilled water to give a stock solution which corresponds to 20mg/ml. The dosage corresponding to 100mg/kg, 200mg/kg and 300mg/km body weight were administered to the experimental male Albino Wistar rats using oral incubator method for a period of twenty one days respectively.

A total of forty male Albino wistar rats were randomly assigned into four study groups on the basis of their weight. The animal studies was conducted in two phases, acute toxicity studies using a dose level of 300mg/kg body weight and chronic toxicity study using graded doses of the extract. In acute toxicity studies, 10 male albino wistar rats were used. This acute dose (300mg/kg body weight) was administered to all animals for 3 days were observed for physical signs of toxicity. Also, physiological parameters were observed, tested and recorded on the animals. In the chronic toxicity studies, Group I served as control and received the normal diet and distilled water. Groups II to IV were the test and administered graded doses, 100mg/kg body weight, 200mg/kg body weight and 300mg/kg body weight of the extract respectively. The animals were weighed before and after the oral administration of the extract which occurs between the hours of 9.00am to 10.00am daily and lasted for 21 days. Extract administration in both animals was by gastric intubation using sterilized syringe and needles.

RESULTS AND DISCUSSION

Table 1: Proximate Macronutrient Composition of Powdered Stem Sample of *Saccharum barberi* (Dry Matter).

Macronutrient	% Dry Matter (w/w)
Crude Fibre	32.30±0.16
Carbohydrate	29.20±0.16
Protein	7.80±0.16
Ash	2.00±0.03
Fat	4.30±0.25

Values: Mean ±SD of 3 Determinations

Table 2: Mineral element composition of Stem Sample *Saccharum barberi* (Dry Matter)

Micronutrients	Concentration (mg/10
Calcium	861.40±0.66
Phosphorus	178.20±1.47
Magnesium	367.10±0.98
Potassium	11.60±0.35
Zinc	10.90±0.35
Sodium	48.20±1.50
Iron	15.90±0.25
Manganese	0.95±0.10

Values: Mean ±SD of 3 Determinations

Table 3a: Effect of *Saccharum barberi* extract Administration on male Albino rats body weight changes after 21 days

Group	Weight before administration (g)	Weight after administration (g)	Difference (g)	Percentage weight change (%)	Growth rate (%)
Group A (Control)	162.50 ±10.36	165.40 ±10.01	2.90	1.79	13.81
Group B (100mg/kg)	163.94±6.78	167.85±6.88	3.91	2.39	18.62
Group C (200mg/kg)	164.61± 3.98	168.42±4.95	3.81	2.32	18.14
Group D (300mg/kg)	166.71± 6.19	171.09±7.54	3.38	2.08	16.10

Values: Mean ±SD of 3 Determinations

Table 3b: T-test for the effect of *Saccharum barberi* extract on the body weight of Albino Wistar Rats

AVB B/F ADM	AVB A ADM	AVC B/F ADM	AVC A ADM	AVD B/F ADM	AVD A ADM
-1.56	**-5.32**	**8.16**	**8.51**	**0.5**	**1.87**

Table 4: Effect of *Saccharum barberi* extract on male Albino wistar rats liver weight

Group	Average liver weight
A Control	7.10 ± 0.17
B 100mg/kg	7.63 ±1.01
C 200mg/kg	6.30 ±0.26
D 300mg/kg	6.94 ±0.17

Values: Mean ±SD of 3 Determinations

DISCUSSION

Result of proximate analyses showed that *Saccharum barberi* has high concentration of moisture, carbohydrate and fibre while concentration of ash, protein and fat were low. This situation gave a proof of why they are easily eaten by ruminants (sheep, goat and cow) as fodder, since fibres are not easily digestible by human gastro-intestinal tract. The high level of carbohydrate in *Saccharum barberi* made it an important fodder for grazing animals such as cow, sheep and zebra. The carbohydrates provide metabolic fuel for these animals and a lot of energy to move about while in addition, it serves as structural support and some important glycoproteins such as the mucin in the nose of these animals.

The result of the micronutrient analyses shown that *Saccharum barberi* contain some iron, zinc, sodium, calcium, magnesium, potassium, phosphorus and manganese. Calcium has a very high concentration compared to others. These minerals functions in osmotic pressure, water distribution and cellular metabolism such as muscle contraction, nerve reaction and blood clotting [8]. Calcium and Phosphorus are necessary for bone and teeth formation, electrolyte balance and maintenance of body fluid while iron deficiency will lead tiredness, shortness of breath, an increase of infection and anemia [9]. These mineral elements in their ionic forms have been implicated in homeostasis within the external and internal environment of the plasma membrane [6]. The stabilization of red blood cell membrane prevents the release of lytic enzymes and active mediators of inflammation such as 5-hydroxyl tryptamine, histamine and kinnins [8].

In the acute inflammation test, the ethanolic extracts from the *Saccharum barberi* indicated an inflammatory response. There were physiological changes in redness of eyes, behaviors, less feeding, shivering and aggression of animals. The paw oedema in Albino wistar rats at early and latter phases of the oedema [9].

The reduction of oedema in this study shows that the extract from *Saccharum barberi* contain some active constituents, which act on the early phase mediators, that arrive first at the site of injury, thereby reducing the vascular permeability, fluid exudation and thus suppressing the oedema [10]. The findings, correlates some early finding of the reduction of oedema in Albino wistar rats by extract of garden egg and ginger [11].

The average body weight of the Albino wistar rats showed increased bodyweight, which was due to normal animal feeds and the growth exhibited within the experimental period of twenty one days. No death was record during the experiment, which show that at the concentration of the extract given for *Saccharum barberi* is not too toxic to the animals. However, immediately after introduction of the extract, the animals were seen to shiver and be calm for sometimes, especially those with the highest while dose given (300mg/kg body weight) and latter regained strength. This could be due to the fact that foreign compound is introduced into the system and initial shock is noticed before it is finally assimilated within the system**.**

CONCLUSION

The proximate analysis showed carbohydrates, moisture and fibre at high concentration. The microelement determination indicated presence of calcium, magnesium and phosphorus at high concentration compared to others; Zinc, Sodium, Iron, Manganese and Potassium. Calcium has a very high concentration compared to others. These minerals functions in osmotic pressure, water distribution and cellular metabolism such as muscle contraction, nerve reaction and blood clotting.

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