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Hematological studies on the effect of *Sacharrum barberi* extract on guinea pigs and albino wistar rats

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ABSTRACT

The results of the hematological indices examined in the experimental animals Albino wistar rats and Guinea pigs were investigated respectively. Forty Albino wistar rats and Guinea pigs 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 and Guinea pigs 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. Hematological finding gathered unsteady rise in RBC, WBC, PCV and MCHC value for Albino wistar rats and Guinea pigs but no steady reduction was noticed for the Hb and platelet indices. In general, the values that were obtained either at an increasing level or decreasing level still falls within the normal range of these hematological parameters for the Albino wistar rats and Guinea pigs and hence it is not a significance change at $p<0.05$.

Keywords: *Saccharium barberi, Hematological indices and Liver weight.*

INTRODUCTION

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 (1).

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, Africa (Nigeria)]. The plant *Saccharum barberi* is known by Yoruba – Ereke Obo (Esun), Ibo-Okpoto, Igala – Okpete and Hausa-Hiiki (Teiwa) (2).

The extracts of *Saccharum barberi* exhibit antidote, antiseptic, antiviral, intoxicant, bactericidal, cardiotoxic, diuretic, laxative and demulcent properties (3,4). 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 (2, 5, 4).

The determination of the hematogical indices such as white blood cells (leucocytes) which play a role in body defense, the red blood cells (or erythrocytes, which are the most abundant and responsible for oxygen transport from the lungs to the body cells and CO_2 in the reverse direction). Hemoglobin, the respiratory pigment present in the red blood cells and is saddled with this function of gaseous transport. The packed cell volume (PCV): This is the percentage of red blood cells in the body, (hematocrit) (6). The mean corpuscular hemoglobin concentration: This is the average concentration of hemoglobin per red blood cell, they are often requested to assist in diagnosis of such pathological conditions as anemia, leukemia and hemorrhage as the case may be. The reduction in RBC count and Hb taken together may point to anemia

MATERIALS AND METHODS

PREPARATION OF PLANT EXTRACT

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 the Department of Botany, Kogi State University, Anyigba, 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 and Guinea pigs were aged between 10–12 weeks and weighed between 130–170g and 200 – 250g 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.

Determination of hematological parameters

The automated method was employed for determination of hematological indices using the Abacus junior Hematology analyzer 2.75 (manufacture in 1995) by Diatron group of company (U.S.A). This instrument is fully an automatic cell counter designed for use in hospital and small to medium size laboratory. The instrument was standardized with thee help of human blood, so that repeated measurement can be made to monitor daily performance of hematology analyzer. Assigned values and expected ranges were determined on system, using Diatron reagents, which is made up of treated stabilized human erythrocytes and stabilized platelets in an isotonic bacteriostatic medium. The hematological indices determined were: (i)White blood cells (WBC) (ii) Red blood cell (RBC) (iii) Packed cell volume (PCV) (iv) Hemoglobin (Hb) (v) Mean corpuscular hemoglobin concentration (MCHC) (vi) Platelets (PL)

RESULTS AND DISCUSSION

Table 1: Effect of Extract Administration on Hematological indices of Albino wistar rats

Group	RBC (L)	WBC (L)	Hb(g/dl)	PLT (L)	PCV (%)	MCHC(%)
A (Control)	$6.8x10^{12}$ ±1.17	$6.00x10^{9}$ ±2.31	158.60 ±10.37	$414.4x10^{9}$ ±54.96	42.45 ±4.55	337.0 ±46.84
B(100mg/kg)	$8.38x10^{12}$ ±1.49	$7.74x10^{9}$ ±3.35	147.90 ±8.68	$360.4x10^{9}$ ±47.79	42.54 ±4.04	307.2 ±59.23
C(200mg/kg)	$7.57x10^{12}$ ±1.44	$7.26x10^{12}$ ±2.76	141.00 ±16.88	$413.26x10^{9}$ ±1.07	41.99 ±4.04	379.5 ±58.66
D(300mg/kg)	$8.58x10^{12}$ ±1.41	$9.95x10^{9}$ ±3.42	146.90 ±17.55	$370.10x10^{9}$ ±73.13	42.58 ±6.05	365.3 ±32.15

Table 2: T-test for Albino wistar rats for hematological indices (p<0.05)

INDICES	AVS B	AVS B	AVS D
WBC	0.42	-4.49	-1.89
RBC	-4.04	0.65	-2.11
Hb	-0.17	0.48	0.67
PCV	-0.26	-0.71	2.93
PLT	-0.92	-10.63	-2.84
MCHC	3.16	-1.94	-3.04

Table 3: Effect of *Sacharrum Barberi* extract administration on haematological indices for Guinea pigs

Group	RBC (L)	WBC (L)	Hb(g/dl)	PLT (L)	PCV (%)	MCHC(%)
A (Control)	$7.72x10^{13}$ ±1.19	$7.60x10^{10}$ ±0.27	162.80 ±9470	$365.50x10^{11}$ ±47.63	45.20 ±7.27	371.3 ±15.38
B(100mg/kg)	$9.25x10^{13}$ ±1.64	$7.50x10^{9}$ ±2.01	167.95 ±2.20	$379.3x10^{11}$ ±3.23	45.80 ±1.10	355.74 ±2.40
C(200mg/kg)	$7.42x10^{13}$ ±8.55	$8.65x10^{9}$ ±6.65	148.50 ±9.77	$772.35x10^{11}$ ±36.68	47.47 ±8.34	381.32 ±5.56
D(300mg/kg)	$8.58x10^{13}$ ±0.50	$8.25x10^{9}$ ±0.02	142.47 ±15.74	$408.3x10^{11}$ ±1.22	37.44 ±4.23	386.15 ±1.58

Table 4: T-test for the Guinea pigs for hematological indices (p<0.05)

INDICES	A VS B	A VS C	A VS D
WBC	-1.35	-1.10	-3.04
RBC	-2.65	4.49	-3.08
Hb	2.51	2.81	1.82
PCV	-0.05	0.24	-0.01
PLT	2.35	21.35	1.61
MCHC	1.25	-1.78	-1.58

Table 5: Effect of *Sacharrum barberi* extract on average liver weight of Albino wistar rats

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

Table 6: Effect of *Sacharrum barberi* extract on average liver weight of Guinea pigs

Group	Average liver weight
A Control	7.10 ±0.22
B 100mg/kg	7.60 ±0.02
C 200mg/kg	6.30 ±0.19
D 300mg/kg	6.94 ±0.26

DISCUSSION

The average body weight of the Albino wistar rats and Guinea shows an increased weight, which was due to normal feeding of the animal, as well as 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. Immediately after administration of the extract, the animals were seen to shiver and be calm for sometimes, especially those with the highest dose given (300mg/kg body weight) and latter regained strength. This could be due to the fact that foreign compound is introduced into the body system initiating shock which is noticed before it is assimilated back into the system.

The results of the hematological indices examined in Albino wistar rats and Guinea pigs shows some little rise in value of RBC, WBC, PCV and MCHC for Albino wistar rats, with the rise not been steady. However, a little but not steady reduction was noticed for the Hb and platelet indices. Similar situation were also observed for the Guinea pigs. In general, the values obtained either at an increasing or decreasing levels falls within the normal range of Albino wistar rats and Guinea pigs hematological parameters and hence it is not a significance change at $p<0.05$. Blood is the most important body fluid that governs vital functions such as respiration, circulation, excretion, osmotic balance, defense and transportation of metabolites. Moreover, blood is an important parameter in clinical biochemistry, population genetics and medical anthropology and hence a valuable diagnostic indicator of many diseases (7). The white blood cell (WBC) as studied in molecular biology of cells acts as chief defense against disease and foreign materials ingested into the body system.

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