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Effect of sub chronic administration of ethanolic root bark extract of *Sarcocephalus latifolius* (Smith) Bruce (*Rubiaceae*) on haematological parameters of rats

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ABSTRACT

The root bark extract of *Sarcocephalus latifolius* was administered to rats at doses of 100-300mg/kg for 20 days to investigate its effect on haematological indices of rats. Haematological indices namely Packed cell volume (PCV), Haemoglobin concentration (Hb), Red blood cell count (RBC), Mean cell haemoglobin concentration (MCHC), Mean cell volume (MCV), and Mean corpuscular haemoglobin (MCH) were assessed from whole blood obtained from the tested animals as well as those in the control group. The extract at the doses administered was found to produce a dose dependant increase in the PCV, Hb, WBC and RBC. The changes in MCHC, MCH, and MCV were insignificant. The result obtained showed that the extract posses hemopoitic property and therefore could be suggested as a control for sickle cell anaemia.

Keywords: *Sarcocephalus latifolius*, haematological indices, haemopoises, rats.

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INTRODUCTION

Herbal medicines are used by about 60% of the world population especially in the developing countries where modern medicines are predominantly used [1]. In Nigeria and other developing countries, traditional medicine accounts for about 80% of the rural populace health needs with the practitioners formulating and dispensing the formulations [2]. The medicaments are usually prepared from a combination of two or more plant products which may contain active ingredients with multiple physiological activities and could be used in treating various disease conditions [3]. *Sarcocephalus latifolius* (Smith) Bruce (Rubiaceae) syn: *S. esculentus* (Afzeli ex. Sabine); syn: *Nauclea latifolia* Smith is a savannah tree or shrub up to 12m high found in undisturbed fringing forest and closed savannah woodland [4]. The root bark is a well known antipyretic, fever, malaria, constipation, blennorrhoea, otitis, abscesses and vomiting remedy [5]. Studies showed that the root has antibacterial activity against gram positive and gram negative bacteria [6]. This study was aimed at investigating the effect of repeated administration of ethanolic root bark extract of *Sarcocephalus latifolius* on haematological indices namely Packed cell volume, Haemoglobin concentraton, Red blood cell count, White blood cell count, Mean cell haemoglobin concentration, Mean cell volume, Mean corpuscular haemoglobin and subsequently evaluate whether its pharmacological uses especially as malaria remedy may have possible side effects such as anaemia which is common with the use of most chemotherapeutic agents.

MATERIALS AND METHODS

Sample collection and preparation

The plant material was collected from Gyella, Mubi South Local Government Area of Adamawa State and authenticated by Prof. S.S. Sanusi a taxonomist of the Department of Biological Sciences, University of Maiduguri. The sample was washed, air-dried and pulverized using mortar and pestle. The pulverized sample (250g) was extracted in a sohxlet extractor with 95% ethanol (60-80^{0}C) for Six hours. The extract obtained was concentrated in-vacuo at 40-45 ^{0}c and stored at 4^{0}C until used.

Animals

White albino rats of mixed sexes weighing 160-190g were obtained from the animal house of Department of Human Anatomy, University of Maiduguri. They were housed in standard cages and fed with growers mash (Sanders Nigeria Ltd) and water *ad libitum*.

Experimental Procedure

The rats were weighed and randomly assigned into four groups of five animals on the basis of weight. Animals in group B, C and D were orally administered with 100, 200 and 300mg/kg of the extract respectively while the animals in group A were orally given normal

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saline (5ml/kg) and served as control. Administration of the extract continued for 20 days. Blood samples were collected at intervals of 4 days using heparinised capillary tubes and pipettes (white and red cell) for haematological studies. Blood haemoglobin (Hb) was determined spectrophotometrically by the cyanomethaemoglobin method[7]. Packed cell volume was determined using the micro haematocrit reader while red blood cell (RBC) count was estimated by haemocytometer method [8]. Blood was diluted in Dacie's fluid which keeps and preserves the integrity of the RBC. For white blood cell (WBC) count, the blood was diluted using 2-3 % solution of acetic acid to which gentian violet was added in the ratio 1:20. The calculation of red cell indices was made according to standard procedure [8].

Mean corpuscular volume (MCV) = PCV× 10/ RBC (μm^3)
Mean corpuscular Haemoglobin (MCH) = Hbc × 10/RBC (Pg)
Mean corpuscular Haemoglobin (MCHC) = Hbc ×100/PCV (%)

Statistical Analysis

Results were presented as mean ± standard Deviation. All the data obtained were statistically analysed using students' t- test. P values less than 0.05 were considered significant.

RESULTS

The result of preliminary phytochemical studies carried out on the root bark of *Sarcocephalus latifolius* is shown on Table 1. Phytochemicals observed include alkaloid, flavonoid, tannins, saponins and steroidal nucleus.

Table1. Phytochemical composition of the root bark of *Sarcocephalus latifolius*

Sl. No.	Constituents / Test	Root bark (ethanolic extract)
1	**Flavonoids**	
	Lead acetate test	+
	NaoH	+
	Iron (ii)chloride	-
2	**Alkaloids**	
	Drangendorff's	+
	Mayer's	+
	Wagner's	+
3	**Saponins**	
	Frothing test	+
4	**Carbohydrates**	
	Molisch's Test	+
	Barfoed's Test	+
	Fehling Test	+
5	**Tannins**	
	Iron (iii) chloride Test	+
	Lead acetate Test	+
6	**Steroidal Nucleus**	
	Salkowski	+
	Liebermann	+

Key: + = Present - = Absent

The study showed that all the animals used in the study gained weight (Table 2). It is interesting to note that the animals in the control group gained more weight compared to the animals in the experimental groups. Weight gained for the experimental animals however decreased with increase doses of the extract.

Table 2: Effects of the graded doses of *S. latifolius* on the body weights of rats ± S.D. (n = 5)

Parameters	Control	100 mg/kg	200 mg/kg	300mg/kg
Initial Weight of rat (g)	101.7 ± 4.1	108.3 ± 4.1	121.7 ± 9.8	103.3 ± 5.2
Weight after 21 days (g)	155 ± 13.8	148 ± 7.5	155 ± 13.8	122 ± 19.4
Difference in weight (%)	52.4	36.7	27.4	18.1

This may have implication when it comes to searching for medicinal plants with active compounds that can help reduce weight gain. Consumption of this plant may have tremendous impact on subjects suffering from hypertriglyceridemia.

The results of the effect of sub-chronic administration of ethanolic root bark extract of *Sarcocephalus latifolius* on haematological indices of rats is presented in Table 3. Treatment of rats for 20 days with the extract resulted in a dose dependent increase of PCV. The increase was insignificant (P>0.05) across the groups as compared to the control. The values of group B, C and D (100, 200 and 300mg/kg) were 44.7±1.03, 45.4±1.73 and 45.6±1.97 as compared to group A (control) of 44.4±0.81. The blood haemoglobin concentrations (g/dl) were increased in a dose dependent fashion with no statistical significant increase (P>0.05) recorded across the groups as compared to the control. The values were 14.3 ± 1.42, 14.5 ± 1.33 and 14.6 ±1.11 (g/dl) for groups B, C and D and 14.0±0.95 for group A (control) respectively. A non significant (P>0.05) increase in RBC count of rats treated with the various doses of the extract was observed. The counts were 4.99±0.26, 5.02±0.39 and 5.15±0.50 millions per ml of blood respectively for group B, C and D while the control group A had a count of 4.89±0.14 millions per ml of blood. There was no significant difference (P>0.05) in the values of MCHC calculated. The values were 32.0±1.32, 31.9±0.77 and 32.0±0.57% for group B, C and D and 31.5±1.17 for group A (control) respectively. The calculated values of MCH showed no significant difference (P>0.05) compared to the control. For B, C and D MCH values of 28.7±5.36, 28.9±3.56 and 28.3±2.17 were recorded while MCH value for the group A (control) was 28.6±6.71 respectively. No significant difference (P>0.05) was recorded for MCV values calculated for the experimental groups as compared to the control. The values were 89.6±3.89, 90.4±4.63 and 88.5±3.87μm^3 for groups B, C and D and 90.4±5.74μm^3 for group A (control) respectively. The white blood count (thousand/µl) was found to increase with increase in dose concentration. However, the increase was insignificant (P>0.05). The values were 6.32±0.78, 6.96±0.84 and 7.37±0.93/µl of blood for group B, C and D while the WBC count for group A (control) was 5.60±0.73/µl respectively.

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Table 3: Effect of Aqueous Root Bark Extract of *Sarcocephalus latifolius* on Haematological Indices of Rats.

Parameters (Mg/kg)	RBC ($\times 10^6$ µl)	PCV (%)	Hb (g/dl)	MCHC (%)	MCH (Pg)	MCV (μm^3)	Total WBC ($\times 10^3$µl)
(A) Control	4.89±0.14[a]	44.4±0.81[a]	14.0±0.95[a]	31.5±1.17[a]	28.6±6.71[a]	90.4±6.74[a]	5.60±0.73[a]
(B) 100	4.99±0.26[a]	44.7±1.03[a]	14.3±1.42[a]	32.0±1.38[a]	28.7±5.36[a]	89.6±3.89[a]	6.32±0.78[a]
(C) 200	5.02±0.37[a]	45.4±1.73[a]	14.5±1.33[a]	31.9±0.77[a]	28.9±3.56[a]	90.4±4.63[a]	6.96±0.84[a]
(D) 300	5.15±0.50[a]	45.6±1.97[a]	14.6±1.11[a]	32.0±0.57[a]	28.3±2.17[a]	88.5±3.87[a]	7.37±0.93[a]

DISCUSSION

The phytochemicals reported in Table 1 are known pharmacologically active principles which may be associated with the biological activity reported in the plant material. Also, the weight gain by the experimental animals may have implication when it comes to searching for medicinal plants with active compounds that can help reduce weight gain. Consumption of this plant may have tremendous impact on subjects suffering from hypertriglyceridemia [9]. Administration of aqueous root bark extract of *Sarcocephalus latifolius* to rats for 21 days produced a dose dependent increase in PCV, Hb, RBC and WBC which showed no significant difference ($P>0.05$) from the control. No significant changes ($P>0.05$) was found in MCHC, MCH and MCV of the treated rats. The dose dependent increase in haematocrit, haemoglobin and red blood cells may have resulted from hemoconcentration, physiologic polycythemia and polycythemia vera .The stimulation of erythropoises shows that the extract possess hemopoitic properties [10]. The extract did not produce any significant change in the Red cell indices (MCV, MCH, MCHC) which shows that the plant extract does not stimulate anaemia and therefore can be suggested in the control of sickle cell diseases [11]. Total white blood cell was observed to have increased following administration of the extract to rats. The increase observed may have resulted from the stimulation of leucocytosis by the extract and also from stimulation of their production in the bone marrow [12]. The result obtained was similar to previous report on hematological parameters by Adedapo *et al.* [13] Further studies to confirm this as well as evaluate its mechanism of action are suggested.

CONCLUSION

From the experiments conducted, the results showed that the extract possess hemopoitic property and ability to reduce weight respectively. Therefore the plant extract could be used as a control for sickle cell anaemia as well as for reduction in weight.

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