

Full Length Research Paper

Phytochemical screening and effect of ethanolic root extract of *Uvaria chamae* on haematological parameters on albino rats in Akwa Ibom State, Nigeria

*Okon J. E.,¹ Udosen I. R.² and Mbong E. O.¹

¹Department of Botany and Ecological Studies, University of Uyo, P. M. B. 1017, Uyo, Akwa Ibom State-Nigeria.

²Department of Biology, College of Education, Afaha Nsit, Akwa Ibom State-Nigeria.

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Phytochemical screening and effect of ethanolic root extract of *Uvaria chamae* on haematological parameters on albino rats in Akwa Ibom State was investigated. Haematological parameters studied were: haemoglobin concentration (Hb.), white blood cell count (WBC), red blood cell count (RBC), packed cell volume (PCV), platelet (PLT), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC). Median lethal doses (LD₅₀) of the extracts were examined intraperitoneally using albino mice. Experimental animals were divided into five groups of 5 rats each, groups I and II served as negative and positive control while groups III, IV and V were administered with the extract orally according to their body weight in doses of 173.21, 346.42 and 519.42 mg/kg body weight for 21 days respectively. Results of the phytochemical screening of *Uvaria chamae* revealed the presence of saponins, terpenes and cardiac glycosides. LD₅₀ of *Uvaria chamae* was 692.82 mg/kg. *U. chamae* extracts significantly ($P < 0.05$) increased Hb. Concentration, RBC, PLT, PCV, MCV count but with a significant ($P < 0.05$) decrease in MCHC and total white blood cell (WBC). The significant increases in the haematological parameters were in dose-dependent fashion. The results of this study thus indicated that these haematological indices might possibly remedy anaemia and could also provide clinical information of *Uvaria chamae* ethanolic extracts as used by traditional medicine practitioners.

Keywords: *Uvaria chamae* root, Haematological indices, Phytochemical screening, Albino rats.

INTRODUCTION

Assessment of haematological profile becomes a pre-requisite to understand the normal functioning of the

System and to further confirm the toxic nature of the administered plant extract or any drug. Alterations in blood parameters may be due to changes in cellular integrity, membrane permeability of cells or even due to exposure to toxic chemicals (Hoffbrand and Pettit, 1997). The importance of blood in maintaining good health cannot be overstated. The Chinese describe blood as the

*Corresponding Author E-mail: joesplendid@yahoo.com
Tel: +2348038811626.

'mother of energy' in the sense that it provides the basic building materials and fluid substances that are required to nourish the life essence of our being; thus blood is represented as a receptacle for sustaining our life energy (Sheng, 2003). The functions of blood are many and varied. Besides providing material nourishments, the blood also provides the necessary moisture needed by the internal organs to function properly. Insufficient blood or blood deficiencies can cause many problems ranging from weakness, lethargy, inability to concentrate, hot flushes, increased susceptibility to infection, shortness of breath, fatigue, dizziness, palpitation, anxiety, depression, insomnia, nervousness, headache and diminished sex drive. Women in particular, are especially susceptible to blood deficiencies due to their monthly menstrual cycle. In addition, because the life span of the red blood cells is relatively short, the blood needs to be constantly replenished (Sheng, 2003). In Nigeria, the local people are known for using natural herbs and herbal formulae for addressing various kinds of blood deficiencies. In south-eastern Nigeria, the roots of *Uvaria chamae* among others, are considered excellent natural herbal blood boosters, used especially for debilitating conditions, acute blood loss and blood deficiency diseases (Obadoni and Ochuko, 2001).

Uvaria chamae, commonly known as finger root or bush banana belongs to the family Annonaceae. *U. chamae* is an evergreen plant which grows to a height of 3.6 – 4.5 m. *U. chamae* leaves are alternately arranged the leaf simple structures, lanceolate in shape with entire lamina and net veined. Leaves are stipulate, leaf apex 2cuminant and the leaf vestiture is glabrous (Bongers, Parren and Traore, 2005). It is a small tree native to the tropical rain forest of West and Central Africa where it grows in wet and coastal shrublands (Arbonnier, 2004, Bongers, Parren and Traore, 2005). All parts of the plant are fragrant, the roots and roots-bark have a widely spread reputation (Iwu, 1993). Tender leaves are eaten as vegetables, *U. chamae* stem ashes serve as salt substitute in food. The leaf juice is applied to wounds, sores, ulcers and cuts while the leaf infusion, as a lotion, is used to treat injuries, swellings, ophthalma, iritis and conjunctivitis. The root (pounded or pulverised) is used for the treatment of nose bleeding, heart diseases (bronchi, lungs etc.), and blood in urine, pile and fever (Adams and Moss, 1999; Etukudo, 2003). The fruits are aromatic popularly used in beverage industry to flavour food. The root yields yellow dye widely used to dye fabrics and cosmetics (Igoli, Ogaji, Tor-Anyiin and Igoli, 2005). However, reports regarding haematological studies of *Sesamum indicum* leaves are scanty; hence the present study was evaluated.

MATERIALS AND METHODS

Plant materials

The roots of *Uvaria chamae* were collected from Mbak Etoi in Uyo Local Government Area in Akwa Ibom State, Nigeria on March 14th, 2012 by the corresponding author, of the Department of Botany and Ecological Studies, University of Uyo, Nigeria. Voucher specimens were deposited at the herbarium (*Uvaria chamae*: Okon, UUH 2682 Uyo) of the University.

Preparation of plant extract

The roots were washed, shade-dried and extracted with 70% ethanol (v/v) by cold extraction for 72 hours. The extracts were evaporated to dryness at 40°C in a water bath. The semi-solid extract was stored in the refrigerator at -4°C for further use.

Phytochemical screening

The experiment was carried out in the Department of Pharmacognosy and Natural Medicine, University of Uyo, Uyo. The phytochemical screening involved the simple chemical test to detect the presence of secondary metabolites. Standard methods of Trease and Evans (2009) were used for phytochemical screening.

Determination of median Lethal Dose (LD₅₀)

Thirty Swiss albino mice weighing 25-32 g were dosed by the intraperitoneal (i.p.) route using the method of Lorke (1983). The animals were administered with 4000 mg/kg, 3000 mg/kg, 2000 mg/kg, 1000 mg/kg and 500 mg/kg of the *Uvaria chamae* extract. The animals were observed for manifestation of physical signs of toxicity and the number of death within 24 hours was recorded. The LD₅₀ was calculated as the geometric mean of the maximum dose producing 0% mortality and the minimum dose producing 100% mortality.

$$LD_{50} = \sqrt{D_0 \times D_{100}}$$

Where: D₀ = Maximum dose producing 0% mortality

D₁₀₀ = Minimum dose producing 100% mortality

Collection and maintenance of animals

Twenty five adult albino rats of both sexes weighing 150-200g were randomly divided into 5 groups of five rats per group. Groups I and II served as the negative and

Table 1. Phytochemical screening of *Sesamum indicum* ethanolic leaves extract

Test	Inference
Saponins	
Frothing test	++
Fehling test	++
Cardiac Glycosides	
Lieberman's test	+++
Keller Kiliani's	+++
Salkowski's test	+++
Terpenes	
Lieberman's test	++

Legend: - = Absent, + = Trace, ++ = Moderate, +++ = Abundance

positive controls respectively, and were fed with standard animal feed (Bendel Feed and Flour Mill Ltd., Benin) only, while groups III, IV and V were the test groups and in addition to the standard animal feed they were also gavaged with 70.0, 140.0 and 240.0 mg/kg ethanol extract of *Uvaria chamae* respectively.

All animals were weighed before treatment commenced and were housed in a standard wooden cage with wooden shavings as their beddings, kept and maintained in the animal house unit of the Department of Pharmacy and Toxicology, Faculty of Pharmacy, University of Uyo, Uyo. They were allowed free access to water *ad libitum*, good light and maintained in room temperature. After 21 days of extract administration, all the experimental rats were sacrificed by a blow on the head, dislocating the neck and the whole blood was obtained by cardiac puncture into EDTA bottles for blood analysis of some haematological indices. This research was carried out in the University of Uyo, according to the rules in Nigeria (Ekpenyong *et al.*, 2011) governing the use of laboratory animals as acceptable internationally.

Determination of haematological indices

The determination of the haematological indices was done within two hours of sample collection using Mindary 5 Path Differential BC 5300 Automated Hematologic Analyser in the Haematology Unit of the University of Uyo Teaching Hospital.

Statistical analysis

This was carried out using windows Statistical Package

for Social Sciences (SPSS) version 17.0. One way analysis of variance was adopted for comparison, and the results were subject to post hoc test using least square deviation (LSD). The data expressed as mean \pm standard error ($P < 0.05$) were considered significant.

RESULTS AND DISCUSSION

The phytochemical screening of the ethanolic extract of *Uvaria chamae* root extract revealed the presence of saponins, cardiac glycosides and terpenes (Tab. 1). The LD₅₀ value of the mice treated intraperitoneally with a single dose of 0.03 - 4.00 g/kg of *Uvaria chamae* extracts after being starved for 18 hours was calculated to be 692.82 mg/kg.

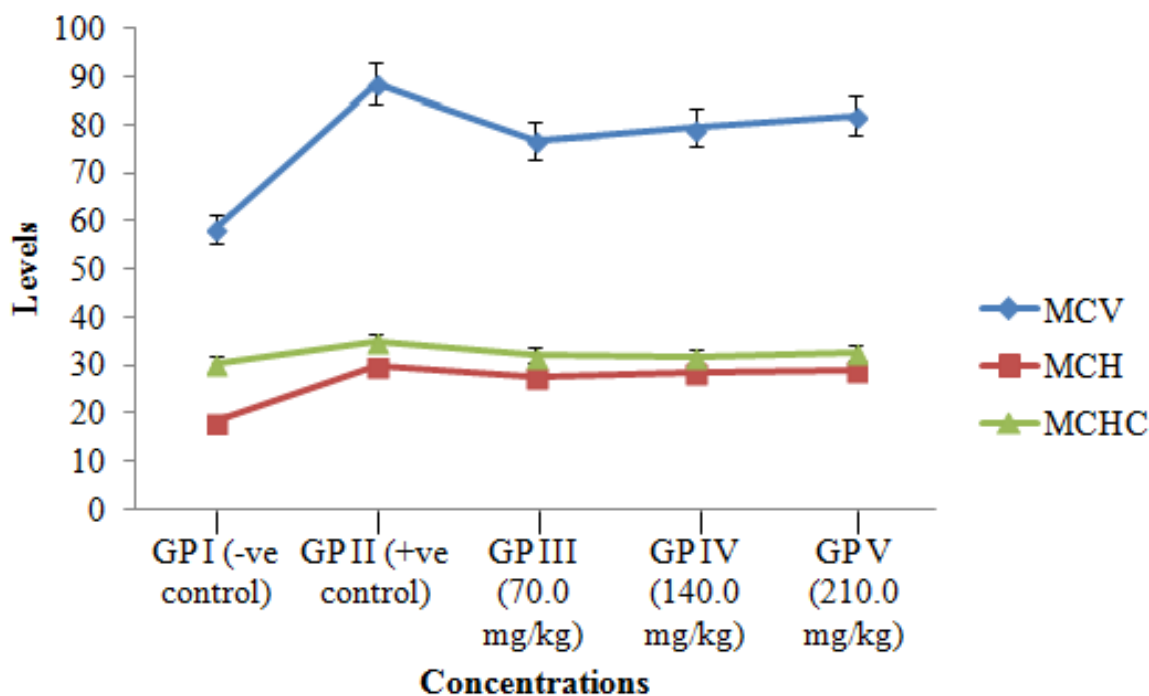
Chronic administration of *Uvaria chamae* extract for 21 days produced various effects on the haematological parameters of wistar albino rats (Tab. 2 and Fig. 1). There were increases in PCV, Hb, RBC, MCH, MCV and PLT, while MCHC and total WBC were decreased. These were significantly ($P < 0.05$) different from control.

The results of this work showed that *Uvaria chamae* root contain abundant cardiac glycosides. Similar reports in other plant species were obtained by Okon *et al.* (2013) who reported the presence of cardiac glycosides in *Baphia nitida* and showed that cardiac glycosides can be used in the treatment of diseases associated with the heart and are currently used by herbalist, to treat tumour in Akwa Ibom state (Piatt, 2000). The cardiac glycosides found in *Uvaria chamae* root can similarly be used for treatment of heart disease problems. Saponins are present in moderate amount. This result is in line with other studies e.g. Okoko (2011) of the presence of saponins in plant (e.g. *Mucuna pruriens*). The work

Table 2. Hematological Indices of Rat Treated with Ethanolic Extract of *Uvaria chamae* root.

Groups	Treatment (mg/kg)	Hb (g/dl)	WBC ($\times 10^9/l$)	RBC ($\times 10^{12}/l$)	PCV (%)
I	-ve control (mL)	9.95 \pm 0.67	17.50 \pm 2.54	7.22 \pm 0.02	39.70 \pm 2.75
II	+ve control (Haematinic)	14.44 \pm 0.05	10.23 \pm 1.80	5.30 \pm 0.21	52.93 \pm 0.24
III	70.0 (Low dose)	13.40 \pm 0.14*	10.87 \pm 0.33	4.71 \pm 0.57*	41.30 \pm 0.28
IV	140.0 (Middle dose)	13.85 \pm 1.06*	10.70 \pm 0.50	4.10 \pm 0.14*	42.55 \pm 1.76
V	210.0 (High dose)	14.40 \pm 0.35*	11.40 \pm 4.44	5.40 \pm 0.07*	46.10 \pm 2.82*

Results are expressed as mean values \pm standard error of mean. *P<0.05 when compared with the control group (n=5).

**Figure 1.** Effect of extracts of *Uvaria chamae* root extract on MCH, MCV and MCHC.

indicated that saponins have the properties of precipitating proteins, cholesterol-binding and haemolysis. Thus, saponins present in *Uvaria chamae* root can help the body fight against infections and microbial invasions.

The results of haematological tests showed a significant (P<0.05) increase in PCV, Hb., RBC, and PLT. Similar results were obtained by Esenowo *et al.* (2010) who suggested that the leaves of *Peristrophe bicalculata* (RETZ) are capable of increasing the PCV, Hb. and

RBC. Their studies confirmed the use of *Peristrophe bicalculata* leaves to restore lost blood during excessive bleeding and same was reported by Okon *et al.* (2013) who work on *Baphia nitida*. *Uvaria chamae* root can be used to restore lost blood during excessive bleeding. MCH and MCV significantly (P<0.05) increased while WBC and MCHC reduced when compared with group I. Similar observations were made by Ahumibe and Braide (2009) who suggested that increase in red blood cells stimulates cytokine erythropoietin. It is likely that increase

in WBC may stimulate cytokine erythropoietin. The mechanism leading to the increase in RBC count is probably mediated by the anti-oxidant property of the extract. This gives the extract the haemopoietic, protective and stimulating potentials. Previous research has shown that, prophylactic and therapeutic oral administration of anti-oxidant supplement in plant extracts significantly increased cells of haemopoietic origin in animals exposed to potentially lethal dose of radiation (Chris *et al.*, 2008). Similarly, anti-oxidants such as Vit. C, Vit. E, succinate and alpha-lipoic have been used to abolish various forms of chemically and metabolically induced oxidative stress to which human haemopoietic cell lines is exposed to (Chris *et al.*, 2008).

CONCLUSION

Uvaria chamae root extract through its anti-oxidant property has haematopoietic, stimulating, enhancing and protective effects. Its use as antianemia and immune booster is therefore supported. The results also furnish evidence that the beneficial effects of this plant may be due to its free radical scavenging activity. However, further work is advocated to elucidate other therapeutic values of *Uvaria chamae*.

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