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Effect of Methanol Extract of *Telfairia occcidentalis* on Haematological Parameters in Wister Rats

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The effects of long-term administration of methanol extracts of *Telfairia occidentalis* (Cucurbitaceae) on hematological parameters was investigated in rats. A total of 15 wister rats were grouped into 3 groups of 5 animals each. Group 1 rats serve as control group, while group B and C was treated with 300 and 600 mL kg^{-1} of *T. occidentalis*, respectively, for 30 days. Results show that the extract at dose of 300 and 600 mL kg^{-1} cause significant increase in ($p<0.05$) Red Blood Cells (RBC), hematocrit (HCT), hemoglobin (HGB), Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC), Red Cell width standard deviation (RCD width-sd) and had no effects on Mean Corpuscular Volume (MCV) when compare with the control rats. Among the leucocytes indices a significant ($p<0.05$), increased in White Blood Cells (WBC) and lymphocyte (LY) count but decrease the mid cell total count (MID) and granulocyte (GRAN) compared to the control rats were observed. The extract at dose of 600 mg kg^{-1} cause significant reduction in thrombocytic parameters, including platelet count (PLT), Mean Platelet Volume (MPV) and plateletcrit (PCT) but had no effects on Platelet Distribution Weight (PDW) when compare with the control rats. However, at dose of 300 mg kg^{-1} all the thrombocytic parameters compare well with the control. It is concluded that, chronic administration of methanol extracts of *T. occidentalis* to wister rats has stimulated leucopoietin and erythropoietin release this has justify the traditional use of the plant as blood builder. However, it inhibitory effect on thrombopoiesis at higher dose has raised concern on its safety.

Key words: *Telfairia occidentalis*, haematology, white blood cells, red blood cells, Swiss albino rat

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INTRODUCTION

Nature has presented to humanity the gift of vast therapeutic workshop with wide varieties of medicinal plant. According to WHO more than 80% of the global population relies primarily on traditional base medicine to meet up their daily health need and have encourage such practice especially where assess to conventional treatment is not available or in adequate (WHO., 2001). However, the inadequate quality control, efficacy and safety validation of medicinal plants has raised concerns over the last decades (Oyewo *et al*., 2012). Therefore, safety/toxicity evaluation of these plants using animal models is widely encouraged, since the responses by these animals to chemical agents could be translated to human respect.

The assessment of haematological parameters provide information on inflammation, necrosis, various infections of visceral organs, presence of stress factors (Jurcik *et al*., 2007; Melillo, 2007; Betancourt-Alonso *et al*., 2011) as well as the extent of deleterious effect of foreign compound including plant extract on the blood (Yakubu *et al*., 2007).

Telfairia occidentalis is a member of Cucurbitaceae family, it is a tropical plants commonly consumed in countries (Fagbemi *et al*., 2005). It is commonly known as fluted pumpkin or ugwu.

The leaves are important sources of nutrients especially, vitamins, minerals it also contain adequate amounts of proteins but low in fiber (Ladeji *et al*., 1995). An review by Eseyin *et al*. (2014), points out several biological and pharmacological activities of *Telfairia occidentalis* among which are anticancer, anxiolytic, antiplasmodial, antioxidant, antidiabetic, hepatoprotective, antimicrobial, haematological, testiculoprotective, anti-inflammatory, sedative and anticonvulsant activities.

Since *T. occidentalis* have been cited in the scientific literature as having medicinal values which communities take advantage of, evaluation of its safety on chronic exposure as one of the criteria stressed out by WHO (2002) for validating the health care usage of plants is of paramounts importance. We have earlier reported the effects of this plant extract on biochemical parameters (Lawal *et al*., 2015a), the present study sort to find out the effects of this plants extract on Haematological parameters upon chronic oral exposure in rats.

MATERIALS AND METHODS

Plant sample: Fresh leaves of *Telfairia occidentalis* were obtained from Minna, Niger State, Nigeria. Taxonomic authentications of the plants were carried out at Departments of Biological Science, Federal University of Technology, Minna.

Preparation of the extraction: The fresh leaves of *Telfairia occidentalis* was properly rinsed with clean water, slice into pieces and air dried before being pulverized with electrical grinding machine. The active portion of the plant was extracted with soxhlet apparatus using methanol at ratio 1:3 (Plant:Solvent). After the extraction, the extract was concentrated using rotary evaporator and the concentrated extract was weighed, stored in an airtight container before being refrigerated until required.

Experimental animals: A total of fifteen white albino rats (*Rattus novergicus*) of both sex with average weight of 120±150 g was procured from the small animal holding unit of the Department of Biochemistry, Federal University of Technology, Minna. The rats were kept in clean plastic cages and maintained under standard laboratory conditions (temperature: 22±3°C, photoperiod: 12 h natural light and 12 h dark, humidity: 40-45%) (Bashir *et al*., 2015). The animals were maintained on standard animal feeds (Bendel feeds and flour mills, Edo state, Nigeria) and tap water *ad libitum*. The principles governing the use of laboratory animals as laid out by the Federal University of Technology, Minna Committee on Ethics for Medical and Scientific Research and also existing internationally accepted principles for laboratory animal use and care as contained in the CCAC (1997) were duly observed.

Experimental protocol: Fifteen Swiss albino rats were grouped into three consisting of five rats each. Group A (control) received orally, 0.5 mL of distilled water (Vehicle for extracts administration) for 30 days while groups B and C were treated like the control except that they received 300 and 600 mg kg^{-1} b.wt., of the extract for 30 days. The administration was done using metal oropharyngeal cannula.

Collection of blood sample: Prior to termination of the experiment on day 31, the rats were fasted overnight but still had access to clean water *ad libitum*. Blood samples were collected by cardiac puncture under ether anesthesia. The blood was collected in sample bottles containing EDTA for hematological analyses (Bashir *et al*., 2015; Shittu *et al*., 2015a).

Determination of hematological parameters: The hematological components including haemoglobin (Hb), hematocrit (HCT), Red Blood Cells (RBC), Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH), Mean Corpuscular Haemoglobin Concentration (MCHC), White Blood Cells (WBC), granulocyte count (GRA) lymphocytes (LY), platelet count (PLT), Mean Platelet Volume (MPV), plateletcrit (PCT) and platelet distribution weight were determined using the automated haematologic analyzer SYSMEX KX21, a product of SYSMEX Corporation, Japan employing the methods described by Dacie and Lewis (2002).

Statistical analysis: Data were analyzed using Statistical Package for Social Science (SPSS) version 16 and presented as Mean±SEM. Comparisons between different groups was done using analysis of variance (ANOVA) and Duncan's Multiple Range Test (DMRT). Values of $p<0.05$ were considered as statistically significant as described by Yalta (2008).

RESULTS

Hematological parameters: The effects of administration of methanol extract of *Telfairia occidentalis* at various doses of 300 and 600 mg kg^{-1} b.wt., on the haematological parameters of albino rats for 30 days are shown in Table 1. Thirty days administration of methanol extract of *T. occidentalis* cause significant increase ($p<0.05$) in RBC, HCT, HGB, MCH, MCHC, RCD width-sd and had no significant ($p>0.05$) effects on MCV when compare with the control rats. Among the leucocytes indices, a significant ($p<0.05$) increased in WBC and LY count but significant ($p<0.05$) decrease in MID and GRAN compared to the control rats were observed. The extract at dose of 600 mg kg^{-1} cause significant ($p<0.05$) reduction in thrombocytic parameters, including PLT, MPV and PCT but had no significant ($p>0.05$) effects on PDW when compare with the control rats. However, at dose of 300 mg kg^{-1} all the thrombocytic parameters were not significantly ($p>0.05$) different from the control rats.

DISCUSSION

The use of medicinal plants in treatments of various illness is increasing globally, as it is widely accepted that the use of plants-derived principles will offer access to effective medical care for the treatment and managements of diseases through self-medication (Lawal *et al*., 2015a). It is however, recommended that safety should be the overriding criterion in the selections of these plants for health care needs (Shittu *et al*., 2015b).

The examination of hematological parameters including the red cells (erythrocytes), white cells (leucocytes) and the platelets (thrombocytes) and factors relating to them, provide information on inflammation, necrosis, various infections of visceral organs and the presence of stress factors (Jurcik *et al*., 2007; Melillo, 2007; Betancourt-Alonso *et al*., 2011). It also plays a vital role in the physiological, nutrition and pathological status of an organism (Odeghe *et al*., 2012). The major functions of the white blood cell and its differentials are to fight infections, defend the body by phagocytocis against invasion by foreign organisms and to produce or at least transport and distribute antibodies in immune response (Lawal *et al*., 2015b).

The significant increased the white blood cells count and lymphocytic count caused by the plants extract reflect leucopoetic and possible immunomodulatory effects of the extract which augmented the production of more WBC and LY (Bashir *et al*., 2015). This will increase the animal's capability of generating antibodies in the process of phagocytocis and have high degree of resistance to diseases and enhance adaptability to local environmental and disease prevalent conditions (Okunlola *et al*., 2012), the result of this study corresponds with earlier findings of Berinyuy *et al*. (2015), who reported similar findings on *S. occidentalis*.

Red blood cell and factors relating to it are major indices for evaluating circulatory erythrocytes and are significant in the diagnosis of anaemia and also serve as useful indices of the bone marrow capacity to produce RBC as in mammals (Peters *et al*., 2011; Ozkan *et al*., 2012). The significant increase in RBC, HCT, HGB, MCH, MCHC, RCD width-sd following administration of *T. occidentalis* is an indication of erythropoiesis stimulation of the extract. The extract must have increase the rate of erythropoietin release in the kidney, which is the humoral regulator of RBC production (Mishra and Tandon, 2012).

The significant reduction in thrombocytic parameters, including PLT, MPV and PCT observed at dose of 600 mg kg^{-1} of the extract could translate the

Table 1: Effects of administration of aqueous extracts on haematological parameters of albino rats

Parameters	*T. occcidentalis* (300 mg kg^{-1})	*Telfairia occidentalis* (600 mg kg^{-1})	Control
White blood cells ($\times10^9$ L^{-1})	7.28±1.04^b	7.07±1.29^b	6.68±1.18^a
Granulocyte (%)	11.45±0.32^b	8.65±0.39^a	16.80±0.24^c
Lymphocytes ($\times10^9$ L^{-1})	5.68±0.32^b	5.20±0.60^b	4.38±0.58^a
Mid cell total count ($\times10^9$ L^{-1})	0.76±0.21^a	1.26±0.08^b	1.20±0.05^b
Red blood cells ($\times10^{12}$ L^{-1})	6.53±0.10^b	6.26±0.10^b	5.72±0.05^a
Hematocrite (L/L)	0.48±0.61^{ab}	0.51±0.00^b	0.39±0.01^a
Hemoglobin (g L^{-1})	169.50±6.93^c	131.00±1.70^b	123.00±1.85^a
Mean corpuscular haemoglobin (pg)	31.25±2.84^b	32.70±1.59^b	21.45±0.35^a
MCH-Concentration (g L^{-1})	371.00±5.76^b	343.00±9.31^b	239.00±3.60^a
Mean corpuscular volume (FL)	85.50±3.85^a	94.00±1.02^a	90.00±0.35^a
Red cell distribution width-sd (FL)	55.15±2.95^a	67.87±1.61^b	51.70±0.35^a
Red cell distribution width-cv (%)	19.55±1.23^a	21.70±0.19^a	19.00±0.11^a
Platelet count ($\times10^9$ L^{-1})	861.00±9.74^b	751.76±3.98^a	815.50±6.83^b
Mean platelet volume (FL)	14.65±0.34^b	12.00±1.02^a	14.15±0.35^b
Plateletcrit (L/L)	1.26±0.02^b	0.95±0.17^a	1.15±0.15^b
Platelet distribution weight (%)	18.30±1.95^a	18.40±0.21^a	18.50±0.03^a

Values are Mean±SEM of 5 determinations. The values along the same row with different superscripts are significantly different ($p<0.05$)

anti-thrombopoetin potency of the extract and that the blood clotting mechanism of the animals will be inadequate with consequents effects of high loss of blood incase of injury (Lawal *et al*., 2015b). However, the fact that all the thrombocytic parameters in rats given the extract at 300 mg kg^{-1} compare well with the control indicated that the dose is not sufficient to cause any adverse effects to the thrombocytic lineage of the blood components.

CONCLUSION

It is concluded that, chronic administration of methanol extracts of *T. occidentalis* to Wister rats has stimulated leucopoietin and erythropoietin release this has justify the traditional use of the plant as blood builder. However, it inhibitory effect on thrombopoiesis at higher dose has raised concern on its safety.

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