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Short communication

Effects of an Ethanolic Leaf Extract of *Gongronema latifolium* on Haematological Some Parameters in Rats

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ABSTRACT: In this study, the effect of ethanolic leaf extract of *Gongronema latifolium* on haematological parameters was investigated. In this study, twenty (20) albino Wistar rats were divided into 4 groups of 5 rats each. The control group was given 2ml of normal saline (orally) while the test groups were given orally; 175mg/kg (low dose), 350mg/kg (medium dose) and 500mg/kg (high dose) of *Gongronema latifolium* ethanolic leaves extract. The feeding regimens lasted for 14 days. After 14 days, blood samples were collected through cardiac puncture for haematological parameter analysis. The result showed that RBC (Red Blood Cell) counts significantly decreased in the low, medium and high dose groups (4.74 ± 0.22 , 5.52 ± 0.13 and $4.54 \pm 0.07 \times 10^6$ cells/mm³ respectively) compared with the control group (7.90 ± 0.31) at $P < 0.05$. Also, significant decreases ($P < 0.05$) in the level of the total WBC (White Blood Cell) count, platelet count, PCV (Packed Cell Volume) and Hb (haemoglobin) concentration were observed. The decreases were dose dependent. The MCH (Mean Corpuscular Haemoglobin) and MCHC (Mean Corpuscular Haemoglobin Concentration) except MCV (Mean Corpuscular Volume) significantly decreased in high dose group only. The results suggest that incessant consumption of the leaves of the plant may not be advisable.

Keywords: Haematological parameters, *Gongronema latifolium*, Blood Cells, Blood, *Gongronema Latifolium* leaves, Rats.

INTRODUCTION

Gongronema latifolium is a leafy vegetable which belongs to the family of plants called Asclepiadaceae and a genus called *Gongronema*. It is harvested from forest in southeastern states of Nigeria and some other parts of Sub-Saharan Africa (Okafor, 1995). The plant is commonly called "Utazi" and "Arokeke" in the southeastern and southwestern parts of Nigeria respectively. The Ghanaians and the Senegalese refer to the plant as Akan-Asante aborode-aborode and Sever Gasule respectively (Hutchinson, 1973).

It has been reported that aqueous and ethanolic extracts of *Gongronema latifolium* exhibited

hypoglycaemic, hypolipidemic, antioxidative, antibacterial activities and emulsifying properties (Ugochukwu *et al*, 2003, Ugochukwu and Badady, 2002, Ugochukwu and Badady, 2003, Ogundipe *et al*, 2003, Oshodi *et al*, 2004, Eleyinmi, 2007). Also, phytochemical analysis of the leaves extract of *Gongronema latifolium* revealed the presence of saponins (steroid glycosides), essential oil, alkaloids (Schneider *et al*, 2003) as well as vitamins, proteins, fatty acid and minerals like calcium, phosphorus, magnesium, copper and potassium (Ajayi *et al*, 2006, Eleyinmi, 2007).

Information on the effects of this widely consumed leaf on the blood cells have not been well established. Therefore, the aim of this work was to scientifically investigate the effect of ethanolic extract of *Gongronema latifolium* leaves on haematological parameters using rats as a case study.

MATERIALS AND METHODS

Experimental Animals

Albino Wistar rats (200-250g) were used in this study. The animals were kept in a spacious and well ventilated

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cage with suitable temperature, relative humidity, food and drinking water for 14 days to acclimatize.

Experimental Plant: Large quantity of fresh leaves of *Gongronema latifolium* was obtained at Mile III market in Port Harcourt, Rivers State, Nigeria. The botanical identification and authentication was done by the Chief Herbarium Officer, University of Port Harcourt, River State, Nigeria.

Preparation of Plant Extract: The leaves were rinsed in clean water to remove dirt, and dried at room temperature for a period of 4 weeks. The dried *Gongronema latifolium* leaves were milled to fine powder in manual engine grinder (Modelcorene, A.5 lander YCIA S.A) and 500g milled powder of *Gongronema latifolium* leaves were then soaked in 300mls of ethanol (80% v/v, BDH) for 48 hours. It was then filtered with Whatman No. 1 filter paper to separate the filtrate from the residue. The filtrate was then dried at 45°C in the oven. The crude ethanolic extract of *Gongronema latifolium* leaves obtained weighed about 58.1g. A stock solution of 1g/ml was then prepared for the experiments.

Experimental Procedure: This study was carried out on 4 groups of rat (n = 5). The control group was given normal saline while test groups were given different concentrations (175mg/kg, 350mg/kg and 500mg/kg, using the LD₅₀ reported by Nwanjo *et al*, 2006) of *Gongronema latifolium* leaves extract (GLLE) via an oral cannula

Fourteen days post-treatment, blood samples were collected into EDTA capped bottles with the aid of a 5ml syringe. The blood samples were then analyzed for haematological parameters.

Determination of hematological parameter: RBC count was done using the method of Dacie and Lewis

(2001). Blood was diluted to 1:200 with Hayem's fluid which preserved the corpuscles and then counted with a Neubauer counting chamber under a light microscope. The counting of total white blood cells was done after the method of Brown (1974) using a diluting fluid (Turk's fluid) in a ratio of 1:20. Sahli's haemoglobinometer was employed for estimation of haemoglobin (Hb) content of the blood, and packed cell volume (PCV) was done using the macrohaematocrit method (Dacie and Lewis, 2001).

Mean Corpuscular Volume (MCV), mean Corpuscular Haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were calculated from values of RBC, PCV and Hb as follows:

$$\text{MCV (fL)} = \text{PCV (\%)} \times 10 / \text{RBC count};$$

$$\text{MCH (pg)} = \text{Hb (g/dl)} \times 10 / \text{RBC count}$$

and

$$\text{MCHC (g/dl)} = \text{Hb (g/dl)} \times 100 / \text{PCV (\%)}$$

All data were presented as mean ± SEM. The one way ANOVA was used to analyze the data, followed by a post-hoc test (LSD). The results were considered significant at P<0.05.

RESULTS

As summarized in the Table 1, the mean RBC counts of control, low, medium and high dose groups were 7.90±0.31, 4.74±0.22, 5.52±0.13 and 4.54±0.07 x 10⁶ cells/mm³ respectively. These values showed that RBC counts significantly decreased in the test groups compared with the control group at P<0.05. The mean total WBC count in control group was 5.42±0.15 x 10³ cells/mm³ while those of low, medium and high dose groups were 4.60±0.17, 4.56±0.15 and 4.00±0.21 x 10³ cells/mm³ respectively. Also, there was significant decrease (P<0.05) of total WBC count in test groups compared with control group.

Table 1:

Haematological Parameters in control and *Gongronema latifolium* leaves extract (GLLE) treated groups of rats (n = 5)

Haematological Parameters	Control	GLLE (175mg/kg)	GLLE (350mg/kg)	GLLE (500mg/kg)
RBC (x 10 ⁶ /mm ³)	7.90±0.31	4.74±0.22*	5.52±0.13*	4.54±0.07*
WBC (x 10 ³ /mm ³)	5.42±0.15	4.60±0.17*	4.56±0.15*	4.00±0.21*
PCV (%)	32.00±0.89	27.20±1.73*	30.20±1.34	26.80±1.98*
Hb (g/dl)	15.14±0.75	12.94±1.17*	14.94±1.53	10.70±0.84*
Platelet(x 10 ³ /mm ³)	135.20±1.61	123.40±1.84*	99.60±3.00*	95.00±2.00*
MCV (fL)	62.86±6.00	58.00±4.37	54.78±2.24	57.24±3.21
MCH (pg)	30.30±4.05	25.56±3.79	29.92±3.86	23.46±1.79*
MCHC (%)	47.56±2.27	42.90±3.52	50.54±6.20	41.56±3.47*

* i.e P<0.05 vs control, Values are mean ± SEM

The mean PCV in control group was $32.00 \pm 0.89\%$ while those of low, medium and high dose groups were $27.20 \pm 1.73\%$, $30.20 \pm 1.34\%$ and $26.80 \pm 1.98\%$ respectively. The mean PCV of the low and high dose group were significantly different from that of control group ($P < 0.05$) while the medium dose group was not significantly different. Also, the mean Hb (Haemoglobin) concentration in low ($12.94 \pm 1.17\text{g/dl}$) and high dose ($10.70 \pm 0.84\text{g/dl}$) groups were statistically significant compared with control group ($15.14 \pm 0.75\text{g/dl}$) while that of medium dose group ($14.94 \pm 1.53\text{g/dl}$) did not differ from control values.

The mean platelet count of low ($123.40 \pm 1.84 \times 10^3$ cells/ mm^3), medium ($99.60 \pm 3.00 \times 10^3$ cells/ mm^3) and high dose ($95.00 \pm 2.00 \times 10^3$ cells/ mm^3) groups were significantly different compared with that of control group ($135.20 \pm 1.61 \times 10^3$ cells/ mm^3). The mean values of MCV for the control, low, medium and high dose groups were 62.86 ± 6.00 , 58.00 ± 4.37 , 54.78 ± 2.24 and $57.24 \pm 3.21\text{fL}$ respectively. These values were not significantly different from each other. The mean values of MCH were also not significantly different among the groups except the high dose group ($23.46 \pm 1.79\text{pg}$) compared with the control group ($30.30 \pm 4.05\text{pg}$). Also, the low ($42.90 \pm 3.52\text{g/dl}$) and medium ($50.54 \pm 6.20\text{g/dl}$) dose groups of MCHC were not significantly different compared with the control group ($47.56 \pm 2.27\text{g/dl}$, $P < 0.05$) but the high dose group ($41.56 \pm 3.47\text{g/dl}$) was significantly different compared with the control group.

DISCUSSION

The effects of ethanolic extract of *Gongronema latifolium* leaves on some haematological parameters were examined in this study. The result showed that the leaves extract of the plant administered at the dosage used and for the period or duration of the experiment seems to suppress the haematopoietic system. There was significant reduction in all haematological parameters (except MCV which showed no significance despite different dosages used) examined in the treated animals compared with the control. The reduction might be due to the presence of saponin, which has been reported to reduce haematological parameters probably due to lysis of blood cells or suppression of blood cell synthesis (Irvine, 1961, Schneider *et al*, 2003).

Moreover, the effects of *Gongronema latifolium* leaves extract on RBC, total WBC and Platelet counts was dose dependent. This dose-dependence phenomenon also explains the effect of saponin on haematopoietic system in such a way that the higher

dose of the extract decreased the blood cells in a greater rate than the low and medium doses. The low and high doses of *Gongronema latifolium* leaves extract significantly reduce PCV and Hb (haemoglobin concentration) while medium dose did not; probably due to a compensatory mechanism that took place in the animals in adjustment to administered medium dosage. However, in this study, only the high dose of the leaves extract of *Gongronema latifolium* significantly reduced MCH and MCHC while no effect was obtained on MCV.

Interestingly, this present study revealed that the effects of *Gongronema latifolium* leaves extract on the RBC count, total WBC count, and haemoglobin concentration was entirely different from the effects of the root extract of the plant on these particular haematological parameters. Antai *et al* (2009) reported that the root extract of *Gongronema latifolium* significantly increased total WBC count and had little or no effect on RBC count. The difference in the effects of the leaves and root extracts of *Gongronema latifolium* on these haematological parameters was due to differences in their phytochemical constituents or compositions. The roots extract of *Gongronema latifolium* contain polyphenol in abundance with moderate amounts of alkaloids, glycosides and reducing sugars (Antai *et al*, 2009) while saponin, essential oil and alkaloids were reported to be present in the leaves extract of the plant. The presence of glycosides in the root extract of the plant caused the increase in total WBC count (Antai *et al*, 2009) because glycoside has anti-inflammatory property and vital effect on inflammatory processes of some pathological states such as bacterial infection, malaria and liver diseases (Ugochukwu *et al*, 2003). Therefore, the outcome of this study and several previous works revealed that the presence of saponin in the leaves extract of the plant significantly reduced all blood cells. In conclusion, it is suggested that the presence of saponin in the leaves of *Gongronema latifolium* as reported in this study suppressed haematopoiesis of all blood cells; therefore incessant consumption of the leaves of the plant is not advisable.

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