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Original Research Article

Effect of Hydro-Methanolic Leaf Extract of *Justicia carnea* on some Haematological Parameters of Indomethacin Treated Wistar Rats

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Abstract: The use of plant-based natural products as medicine is a common practice in low income countries. In cultures *Justicia carnea* (JC) is mainly cultivated because of its perceived hematinic effect. The study involved a total of twenty-five wistar rats separated into five groups of five rats each. Group 1 served as control and received distilled water. Groups 2 to 5 received respectively a single oral dose of 30mg/kg indomethacin (Sabiu *et al*., 2015). While group 2 remained untreated (Indomethacin-only group), groups 3, 4 and 5 respectively received in addition 200mg/kg, 500mg/kg and 1000mg/kg of JC leaf extract for 14 days. The results showed that at lower concentrations (200mg/kg and 500mg/kg) there were no significant changes in the measured hematological parameters. The 1000mg/kg JC caused significant rise in red blood cell count, packed cell volume and lymphocytes but depressed neutrophils without any significant effects on the platelet count. Conclusively, consumption of high concentrations of *Justicia carnea* leaves improves red blood cell count and thus possibly ameliorates indomethacin induced anemia in wistar rats. Although, JC leaves did not cause any significant changes in the platelet count, it significantly reduced neutrophils and elevated lymphocytes.

Keywords: *Justicia carnea*, haematological parameters, indomethacin.

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INTRODUCTION

The health benefits of fruits and vegetables cannot be overemphasized. This is possible because in their unrefined or minimally refined forms they are mainly endowed with numerous nutritive and medicinal properties (Slavin and Lloyd, 2012; Del Río-Celestino and Font, 2020; Pogonici and Butnariu, 2022; Liu *et al*., 2024). Although many fruits and vegetables generally contain vitamins, minerals and dietary fibers, some have additional specific components that makes them exceptionally beneficial in the prevention and management of certain diseases (Ajah *et al.*, 2017; Obia *et al*., 2017; Obia *et al.*, 2018; Obia and Asuquo, 2018; Charles *et al.*, 2024; Eifuobhokhan *et al.*, 2024; Obia *et al*., 2024). The use of plant-based natural products as medicine is a common practice in low income countries because they are easily accessible and affordable and also partly because the herbalists (or traditional healers) greatly influence the mode of treatment of certain ailments in the traditional communities where modern health facilities are almost moribund. Plant-based medicines are also believed to be less toxic when compared to synthetic medicines. *Justicia carnea* is an edible plant with enormous medicinal benefits (Onyeabo *et al*., 2017; Oladele & Elem., 2018, Anigboro *et al*., 2019; Yazarlu, *et al.*, 2021; Eifuobhokhan *et al.*, 2024; Obia *et al.*, 2024). In cultures where it is grown and consumed, it is often named according to its medicinal use, including ‘‘blood medicine or hospital too far’’ due to its presumed hematinic effect. Traditionally, various species of *Justicia carnea* are utilized in the management of diabetes, diarrheal diseases, hepatic and gastrointestinal disorders (Orijakor *et al*., 2019; Ukpabi-Ugo *et al.*, 2019; Oloruntola *et al*., 2023; Obia *et al.*, 2024).

The aim of the present study is to assess the effect of different doses of *Justicia carnea* leaf extract on

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some hematological parameters of indomethacin treated Wistar rats.

MATERIALS AND METHODS

The experiment was carried conducted at the animal house of the department of Human Physiology, faculty of Basic Medical Sciences, University of Port Harcourt in the year 2023. A total of twenty five Wistar rats weighing 100 - 240g were separated into five groups of five rats each. These animals were acclimatized for two weeks and during which period they were given water and animal feed *ad libitum*. Ethical approval for the study was obtained from the University of Port Harcourt Research Ethics Committee with approval number UPH/-CEREMAD/-REC/MM85/-034.

Justicia Carnea leaves used in this study were sourced and bought from Epie community in Bayelsa State and identified and authenticated at the department of Plant Science and Biotechnology. The aqueous leaf extract was prepared thus; fresh leaves of the *Justicia carnea* were properly washed in clean water and air dried. The dried leaves were pulverized into coarse powder using an electric blender. Twenty-five grams (25g) of the powdered form was macerated in 100ml of hydro-methanol (70ml of methanol + 30ml of distilled water) for 24hrs via mechanical agitation at room temperature. The suspension was filtered using Whatman's filter paper and dried in a water bath at approximately 55℃ crude extract gotten was stored at 4ºC.

The experimental design was as follows; Group 1 served as control and received distilled water. Groups 2 to 5 received respectively a single oral dose of 30mg/kg indomethacin (Sabiu *et al*., 2015). While group 2 remained untreated (Indomethacin-only group), groups 3, 4 and 5 respectively received in addition 200mg/kg, 500mg/kg and 1000mg/kg of *Justicia Carnea* leaf extract. The experiment lasted for a period of 14 days and thereafter blood samples were collected from the animals to estimate the hematological parameters.

Statistical analysis was done using SPSS vs 22.0 (SPSS incorporated, Chicago, Illinois, USA) and Microsoft excel. Tables were used to represent data. Continuous variables were represented as mean ± SEM while discrete variables were represented in percentages. Comparison of means was done using one-way ANOVA test and differences in values considered statistically significant at $p<0.05$.

Table 1: Effects of *Justicia carnea* (JC) leaf extract on Red blood Cell (RBC) count, packed cell volume (PCV) and Platelet count

Group	Treatment	RBC ($x\ 10^{12}$/L)	PCV (%)	Platelet count ($x\ 10^{9}$/L)
1	Control	6.68 ± 0.46*	43.40 ± 2.69	514.00 ± 40.02
2	IND Only	5.46 ± 0.40	36.80 ± 2.08	509.60 ± 52.80
3	IND + J.C (200mg/kg)	5.60 ± 0.49	37.60 ± 3.11	446.80 ± 52.06
4	IND + J.C (500mg/kg)	6.00 ± 0.36	39.20 ± 2.85	577.40 ± 40.38
5	IND + J.C (1000mg/kg)	7.16 ± 0.23*	44.80 ± 1.24*	595.60 ± 11.59

* Significantly different compared to the IND only, at $p<0.05$.

Table 2: Effect of Leaf extract of *Justicia carnea* on white blood cell count and differentials

Group	Treatment	WBC ($x\ 10^{9}$/L)	Neutrophils (%)	Lymphocytes (%)	Eosinophils (%)	Basophil (%)
1	Control	9.90 ± 1.12	73.00 ± 1.51	20.60±1.50*	2.20 ± 0.37	0
2	IND Only	8.74 ± 0.68	77.40 ± 1.63	15.80 ± 1.43	2.60 ± 0.60	0
3	IND+J.C (200mg/kg)	9.24 ± 0.82	79.60 ± 1.43	15.00 ± 1.14	2.00 ± 0.00	0
4	IND+J.C (500mg/kg)	9.24 ± 0.80	74.40 ± 2.06	17.40 ± 1.63	3.20 ± 0.49	0
5	IND+J.C (1000mg/kg)	11.56±1.31	70.60 ± 1.32*	22.00± 1.38*	2.40 ± 0.24	0

* Significantly different relative to the IND only, at $p<0.05$. JC= *Justicia carnea*, IND =Indomethacin.

In the present study, oral administration of indomethacin (IND) caused significant reduction in RBC and Lymphocytes. Although IND caused no significant changes in the other hematological parameters measured, a slight reduction was noted in PCV, WBC and Platelet count and a slight increase in Neutrophil and Eosinophil. IND triggers gastric lesions by suppressing platelet aggregation (Fisher *et al*., 1987) and inhibiting prostaglandins (Takeuchi 2012), resulting in hemorrhage. Loss of blood in the gastric mucosa may be responsible for the IND induced reduction in RBC count in the present study. The effect of IND in our study suggests that it selectively suppresses the hemopoietic cells and also components of the immune system (Boorman *et al*., 1982).

Administration of *Justicia carnea* (JC) leaf extract showed dose-dependent changes in the hematological parameters of IND treated wistar rats compared to the group treated with IND only. These changes were non-significant in the groups that received 200mg/kg and 500mg/kg of JC extract. However,

administration of 1000mg/kg of the extract caused significant increase in RBC count, PCV and Lymphocytes but significant reduction in Neutrophil. These findings using the high dose (1000mg/kg) agrees with other researchers who have explored the hematinic potential and other beneficial effects of JC leaf making it as a ‘‘wonder’’ plant (Orijiakor *et al*., 2019; Onyeabo *et al*., 2021; Oloruntola *et al*., 2023; Eifuobhokhan *et al*., 2024; Obia *et al*., 2024; Obia and Eifuobhokhan 2024). Previous studies suggest that the hematinic potential of JC leaf may be attributed to its abundant composition of iron and vitamins (Andrew *et al*., 2024). It also contains antioxidants and other phytochemicals (Arthur *et al*., 2022; Ajuru *et al*., 2021; Andrew *et al*., 2024) that possibly prevented or ameliorated the deleterious effects of IND. Neutrophils are known to form first line of defense against invading pathogens (Kraus and Gruber 2021) and for this reason, cautious consumption of high concentrations of JC is advised considering that at the high dose of 1000mg/kg it caused a significant reduction in the neutrophil count. However, there was a rise in lymphocyte count following administration of 1000mg/kg of JC extract. Neutrophil to lymphocyte ratio (NLR) is a useful prognostic biomarker in patients with sepsis and higher NLR may indicate unfavorable condition (Huang *et al*., 2020). Despite its effect on RBC count, platelet count was not significantly affected by any concentration of JC in the present study. This is beneficial because erythropoietic activity is achieved without possible interference with the platelets in the coagulation pathway.

Conclusively, consumption of high concentrations of *Justicia carnea* leaves improves red blood cell count and thus possibly ameliorates indomethacin induced anemia in wistar rats. Although, JC leaves did not cause any significant changes in the platelet count, it significantly reduced neutrophils and elevated lymphocytes.

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