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EFFECT OF *XYLOPIA AETHIOPICA* (NIGRO PEPPER) ON SOME BLOOD PARAMETERS IN MALE WISTAR RATS

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ABSTRACT

Background: This study investigated the effects of *Xylopia aethiopica* (Nigro pepper) on some blood parameters in male Wistar rats. **Materials and Methods:** Ten Wistar rats weighing 160 – 200g were divided into two groups (n=5). Control group received rat feed and water while the *Xylopia aethiopica* extract treated group received 10mg/kg b.w of the extract orally for 28 days. **Results:** Red cell distribution width, platelet count, plateletcrit, mean platelet volume, platelet distribution width and platelet large cell ratio were not significantly different between the two groups. **Conclusion:** The ethanolic extract of *Xylopia aethiopica* at a low dose of 10mg/kg b.w showed no significant effect on red cell distribution width and platelet indices. Further studies at higher doses of *Xylopia aethiopica* are encouraged to establish their clinical relevance in the management of hematological disorders.

KEYWORDS: *Xylopia aethiopica,* blood, red blood cell, platelet.

INTRODUCTION

Plants are said to contain substances (bioactive phytochemicals) that are either of therapeutic value and mostly precursors for synthesis of many known drugs today in modern medicine (Sofowora, 1982). These medicinal plants are believed to play essential roles in the amelioration of diseases that are associated with oxidative stress by reducing the concentrations of free radicals in the system. Many medicinal plants are said to contain ingredients that are either of therapeutic value or are pioneers for synthesis of useful drugs (Obembe*et al*., 2015). One of such plants is *Xylopia aethiopica* (Nigro pepper) of the family *Annonaceae.* Many of these botanicals have been shown to possess hematopoietic ability due to their mineral compositions.In the plant ref list of 2013, nine different synonyms are documented viz-a-viz; *Xylopia aethiopia* (Dunal) A. Rich: *Annona aethiopia* (Dunal) Steud., *Habzel aethiopia* (Dunal) ADC., *Fabzel aethiopia* DC., *Unona aethiopia* Dunal., *Uvaria aethiopia* (Dunal) A. Rich., *Xylopia dekeyzeriana* De Wild., *Xylopiaemini* Engl., *Xylopiagilletii* De Wild., and *Xylopicrum aethiopicum* (Dunal) Kuntze.

Widespread poverty and illiteracy is alleged to be the probable cause of the continuous use of traditional plant-based medicines and this continued application tends to reduce the desire for conventional medical services. Notwithstanding, a large number of these tropical plants and their extracts has shown beneficial therapeutic effects such as fertility enhancing capability, anti-oxidant, anti-inflammatory, anti-cancer and anti-microbial potentials (Raji *et al*., 2006).Some of the properties that have been reported concerning *Xylopia aethiopica* includes alkaloids, glycosides, saponins, tannins, proteins and acidic compounds (Burkhill, 1985) some of which might be responsible for the documented medicinal and pharmacological properties of *Xylopia aethiopica*. Burkhill (1985) and Okeke *et al.*(2008) both asserted that, the fruit serves as spice.Regardless of the fact that all foods have therapeutic, nutritional or toxic effects (Chike and Adienbo 2010; Uzodike and Onuoha, 2010), *Xylopia aethiopica*misuse and mass intake have been reported in populations (Riddle, 1992; Onyeyili, 2000; and Hashemi *et al*., 2008). However, the dietary effects of whole fruits of *Xylopia aethiopica* (the form in which the spice is consumed by humans) on blood have

not yet been fully ascertained. Hence, this study was undertaken to investigate the impact of *Xylopia aethiopica* on blood parameters using adult Wistar rats as model.

MATERIALS AND METHODS

Collection and preparation of *Xylopia aethiopica* extract

The fruits of *Xylopia aethiopica* were purchased from Marian market, Calabar, Cross River state and subsequently identified in the Department of Botany, University of Calabar. The fruits were sundried for some days after which they were ground into powered form using an electric blender for the preparation of the extract. The powered fruits were extracted from ethanol by percolation for 48 hours. The mixture was filtered and the filtrate evaporated at 6000 ^{0}C using vacuum rotary evaporator. The wet residue was freeze-dried using a vacuum freeze drier and stored in a desiccator. An aliquot potion of the crude extract was dissolved in distilled water for use on each day of the experiment.

Laboratory animals

Approval to conduct the study was granted by the Animal Research Ethics Committee of Faculty of Basic Medical sciences, University of Calabar, Nigeria. Ten male Wistar rats (160 – 200 g) were used for the study. The animals were bought from Department of Agriculture, University of Calabar and kept in individual metabolic cages in the animal room of Physiology Department. The 1985 guidelines of the National Institute of Health publication for laboratory animals were followed in the handling of the rats. They were subjected to 12/12 - h light/dark cycle and acclimatizedfor one week before commencement of the feeding regimen.

Experimental protocol

Ten rats were randomly assigned into two (2) groups of five (5) rats each namely: Control group (Group 1) and the extract group (Group 2). The control received normal rat feed while the extract group was given normal rat feed plus 10 mg/kg body weight of ethanolic fruit extract of *Xylopia aethiopica*. The administration lasted for 28 days.

Collection of blood samples

At the end of the study period, the rats were anaesthetized with pentobarbital (60 mg/kg b.w.) and sacrificed. Blood samples of the animals were collected via cardiac puncture using 5 mL syringes attached to 21 G needles into ethylenediaminetetracetate (EDTA) vials and gently agitated to ensure uniform spread of EDTA. The samples in the EDTA vials were used for determination of red cell distribution width (RDW), platelet count, plateletcrit, mean platelet volume (MPV), platelet distribution width (PDW) and platelet large cell ratio (P-LCR).

Determination of blood parameters

Red cell distribution width, platelet count, plateletcrit, mean platelet volume, platelet distribution width and platelet large cell ratio were determined using automated cell counter (Coulter Electronics, Bedfordshire, UK) having standard calibrations in line with the manufacturer's instructions.

Statistical analysis

Statistical analysis was carried out using SPSS Statistics software, version 20. Theresults are presented as mean ± standard error of the mean (SEM). Students' t test was employed to analyze the data and compare the mean difference between the two groups. Values of $p < .05$ were considered significant.

RESULTS

Red blood cell distribution width (RDW) in the control and *Xylopia aethiopica*treated groups

Table 1 shows the result of red blood cell distribution width for control and *Xylopia aethiopica* treated groups. The result showed no significant difference in red blood cell distribution width between the two groups.

Platelet count in the control and *Xylopia aethiopica* treated groups

Table 1 also shows the resultof platelet count in the control and *Xylopia aethiopica* treated groups. There was no significant difference in the platelet count in the *Xylopia aethiopica* treated group compared with control group.

Plateletcrit in the control and *Xylopia aethiopica* treated groups

Plateletcrit in the control and extract treated groups is shown in Table 1. The result shows that there was no significant difference in the plateletcrit between the two groups.

Mean platelet volume in the control and *Xylopia aethiopica* treated groups

The result shows no significant difference in the mean platelet volume in the *Xylopia aethiopica* treated group compared with the control (Table 1).

Platelet distribution width in the control and *Xylopia aethiopica* treated groups

The result shows no significant difference in platelet distribution width in the treated group compared with control (Table 1).

Platelet large cell ratio in the control and *Xylopia aethiopica* treated groups

The result shows no significant difference in platelet large cell ratio in the treated group compared with the control group (Table 1).

Table 1: Hematological parameters in the control and *Xylopia aethiopica* treated groups.

Parameter	Group 1 (Control)	Group 2 (Extract)
RDW(fL)	24.48±2.63	27.27±1.51
Platelet count(x10^3 cell/µL)	512.60±48.63	602.00±44.26
Plateletcrit(%)	0.41±0.04	0.51±0.04
MPV (fL)	7.98±0.32	8.52±0.34
PDW (fL)	35.3±60.9	36.07±0.74
P-LCR(%)	17.67±2.23	20.85±2.31

Values are mean ± SEM, n = 5. No significant difference between groups.

DISCUSSION

Blood is the fluid of life and the medium in which most physiological and biochemical processes of the body are facilitated. When the homeostasis of the blood system is altered, it may compromise many important body functions and cause ill health (Onyebuagu *et al*., 2014). Red blood cells majorly carry oxygen and its main constituents being haemoglobin. Haemoglobin is a potent pigment that gives the red blood cell its color.This study investigated the effect of *Xylopia aethiopica* on some blood parameters in Wistar rats. The results show no significant differences in the haematological parameters of the animals fed with ethanolic fruit extract of *Xylopia aethiopica* compared with control. This is in contrast to the reports of Johnkennedy *et al.* (2011) and Woode *et al*. (2011). These researchers reported a dose dependent increase in red blood cell (RBC) count, packed cell volume (PCV) and platelets but a significant decrease in Hb, WBC and neutrophil counts in the treated groups. Onyebuagu *et al.* (2015) reported that the fruits of *Xylopia aethiopica* significantly increases Hb, PCV, mean corpuscular volume (MCV) and RBC count but significantly decreases erythrocyte sedimentation rate (ESR) and total cholesterol in male Wistar rats. They concluded that the whole fruit of *Xylopia aethiopica* demonstrated positive effects on blood cell indices almost certainly by virtue of its rich iron content.Meanwhile, Obembe *et al*. (2015) reported that administration of 100 mg/kg b.waqueous extract of *Xylopia aethiopica* showed no significant change in red blood cell count, packed cell volume, mean corpuscular haemoglobin, and MCV but decreased WBC, Hb and MCHC and increased clotting and bleeding time.

Abaidoo *et al.* (2011) also reported that oral administration of the *Xylopia aethiopica* extract produced significant augmentation of Hb, total white blood cells and neutrophil but did not affect RBC and hematocrit. Similarly, Onyebuagu*et al.* (2014) reported that, *Xylopia aethiopica* demonstrated significant increases in Hb concentration, PCV, MCV and RBC counts, and significant decreases in ESR in male Wistar rats. In our study, there was no significant difference in RDW, platelet count, plateletcrit, mean platelet volume, platelet distribution width and platelet large cell ratio in the *Xylopia aethiopica* treated groups compared with control. This may be due to the methodology employed and the low dose of *Xylopia aethiopica* administered.

CONCLUSION

The ethanolic extract of *Xylopia aethiopica* at a low dose of 10mg/kg body weight showed no significant difference in RDW, platelet counts, plateletcrit, mean platelet volume, platelet distribution width and platelet large cell ratio. Further studies at higher doses of *Xylopia aethiopica* are encouraged to establish their clinical relevance in the management of hematological disorders.

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration by all authors. CCM conceived the study. NME and CCM designed the study and analyzed the data. SO and MJA wrote the first draft of the manuscript. All authors participated in the experiments, read and approved the final manuscript.

CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest.

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