Influence of sub-chronic administration of fruit extracts of *Xylopia aethiopica* on haematopoietic system of male Wistar albino rats

ABSTRACT

This study investigated the hematological effects of aqueous and methanolic fruit extracts of *Xylopia aethiopica* on Wistar albino rats. A total of 84 rats weighing between 100 and 120 g were randomly selected and divided into seven groups (A-G) of four rats per group with 3 replicates. Group A (control), was administered commercial feed and water only *ad libitum*, groups B, C, D were administered 50 mg/kg, 100 mg/kg and 150 mg/kg body weight of aqueous extract of *Xylopia aethiopica* respectively while rats in groups E, F, G were fed orally with 50 mg/kg, 100 mg/kg and 150 mg/kg body weight of methanolic extract of *X. aethiopica* respectively. The study lasted for 6 weeks accompanied by weekly collection of blood samples for analysis. Results showed a significant ($p<0.05$) decrease and non-significant ($p>0.05$) difference in PCV level (weeks 1 and 2) in the low dose groups (50 mg/kg) and other groups respectively when compared to the control. The RBC count of all groups in the aqueous extract (week 2) showed a significant ($p<0.05$) decrease while other groups showed non-significant ($p>0.05$) difference (weeks 1 and 2) in RBC, WBC and HB levels when compared to the control. In week 4, there was significant ($p<0.05$) decrease in WBC level and a non-significant ($p>0.05$) difference in HB and RBC concentrations across all groups, respectively while the high dose (150 mg/kg) and other groups showed significant ($p<0.05$) and non-significant ($p>0.05$) difference, respectively in PCV level when compared to the control. Week 5 results showed non-significant ($p>0.05$) difference in RBC and WBC counts across all groups, while HB concentration showed significant ($p<0.05$) increase and non-significant ($p>0.05$) difference in the aqueous and methanolic extracts across all groups respectively when compared to the control. The significant ($p<0.05$) decrease in weight of the animals as observed majorly in all groups across the six (6) weeks is indicative that the extracts may likely be beneficial in obesity control and was similar for both methanol and aqueous extracts. This study suggests that extracts of *Xylopia aethipica* possess some influence on the hemopoietic system and may have weight lowering properties.

KEY WORDS: haemopoietic system, xylopia aethiopica, wistar albino rats, extracts.

1.0 INTRODUCTION

Plants have been used for food, fuel, medicine and various other purposes long before now[1]. The World Health Organization (WHO) noted that of the 119 plants-derived pharmaceutical drugs, 74 % are used in modern medicine in ways that correlated directly with their traditional uses as Herbal plant medicine by native culture. WHO estimated that about 80 % of the world population presently uses herbal medicine for some aspects of their primary health care needs while plant products also play important roles in the health care system of the remaining 20 %, who mainly reside in developed countries[2].

The blood is a vital fluid, which contains the Red Blood Cell (RBC), White blood cells (WBC) and platelets suspended in the plasma in homeostatic concentrations. The circulatory blood

volume makes up about 8% of the weight of an average man. The blood cells take up about 45% of the blood, while plasma constitutes about 55% [3].

It is important for pulmonary and tissue respiration, as a medium of endocrine and neurohumoral transmissions, biotransformation and metabolic excretion[1], nutritional and immunological processes, as well as homeostatic responses[4]. Laboratory determination of blood parameters is highly useful for the purpose of disease diagnosis[5 6.]

Xylopia aethiopica is a tropical West American evergreen tree bearing aromatic seeds usually used as condiment. The fruit decoction is used to treat bronchitis, asthma and rheumatism[7]. *X. aethiopica* is used in many herbal preparations to produce xylopic acid, a substance which has been found to have antimicrobial effects[8]. It has a wide spectrum of biological activities which include: antimicrobial[9], antiparasitic[10], insecticidal[11], antifungal[12], antioxidant[13], diuretic and hypotensive[14], antimalarial1 and membrane stabilization. It plays vital roles in traditional medicines because of its pharmacologic properties[15]. The essential oil as well as the crude extracts of the plant has been shown to have antimicrobial property against a wide range of Gram positive and Gram negative bacteria, and *Candida albicans*[16].

Nigeria has rich genetic resources of cultivated, semi-wild and wild species of crops being used as traditional vegetables and different types are consumed by the various ethnic groups for different reasons. Edible vegetable leaves are the cheapest and most accessible source of proteins, vitamins, minerals, essential amino acids. They play crucial roles in maintenance of health and prevention of diseases[17].

Malnutrition and infectious diseases remain a huge challenge in developing countries such as Nigeria, thus necessitating the need to further search for readily available sources of nutrition especially of plant origin. In this study, the effect of *Xylopia aethiopica* on haematological parameters was therefore determined using Wistar albino rats.

2.0 MATERIALS AND METHODS

2.1 Plants materials

Dried fruits of *Xylopia aethiopica* were bought from Orie Orba market, Orba Udenu LGA, Nigeria. Its botanical identification and authentication was done at the Department of Plant Science and Biotechnology, University of Nigeria, Nsukka, were voucher specimen already exists (University of Nigeria Herbarium UNH No 5a)

2.2 Preparation of *Xylopia aethiopica* Fruit Extract

The fruits were washed with clean tap water and sun-dried. The sample was made into a powder with a grinding machine. The method of extraction followed that of Carvajal-zarrabal *et al*., (2009)[18]. A quantity, 135 g of the powdered material was soaked with 500 ml of 80% analytical methanol in a flask and left for 48 hr with an occasional shaking to increase the extraction capacity. Thereafter the soaked sample was filtered and concentrated to dryness in a rotary evaporator and weighed. Solution of the extract was prepared by dispersing 1 g of the dried extract in 10 ml of 2% Tween 80 solutions for oral administration. This formed the methanolic extract while the aqueous extract was obtained by soaking 135 g of the powdered plant material in 500 ml of distilled water in a flask for two days with an occasional shaking to increase the extraction capacity; this was later filtered with a filter paper.

2.3 Experimental Animals

Eighty four (84) male albino rats (100-120 g) of the Wistar strain of known weights were purchased from the breeding and genetics unit of Department of Zoology University of Nigeria, Nsukka. The animals were kept in well ventilated stainless steel cages, were handled with care and acclimatized for one week. Animals were fed commercial rat feed (vital growers mash) and clean tap water *ad libitum*. The experimental rat were randomly selected and divided into seven groups (A-G) of four rats per cage with 3 replicates.

Group A served as control, administered commercial feed and water only, while group B-D were administered different concentration (50 mg/kg, 100 mg/kg and 150 mg/kg) of aqueous extract of *Xylopia aethiopica* respectively while rats in groups E-G were treated orally with 50 mg/kg, 100 mg/kg and 150 mg/kg concentration of methanolic extract of *X. aethiopica* respectively.

2.4 Collection of Blood samples and Estimation of Blood Parameters

Blood samples was collected weekly via the media cantum (ie ocular punture) for estimation of packed cell volume (PCV), total leucocytes count, total erythrocyte count. The blood samples were drained into vials containing EDTA and were labelled properly while other drops of blood were drained into vials without EDTA for biochemical tests.

2.4.1 Haematological Analysis

Haemoglobin estimation, packed cell volume estimation, red blood cell count were carried out using standard procedure as described by Ochei and Kolhatkar (2008)[19].

2.5 Statistical Analysis

Data collected were analyzed for significant differences for mean ± SD ($P < 0.05$) compared to respective controls by one way ANOVA using the statistical package for social sciences (SPSS) version 17 mean of groups were separated using Duncan Multiple Range Test LD_{50} was determined using probit log analysis.

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3.0 RESULTS

Table 1: Changes in haematological parameters of rats administered different concentration of methanolic and aqueous extracts of *Xylopia aethiopica* in Week 1.

	Control	Aqueous			Methanolic		
Parameters[2]	Distilled water	50 mg/Kg	100 mg/Kg	150 mg/Kg`	50 mg/Kg	100 mg/Kg	150 mg/Kg
Weight (g)	175.00±0.00^{a}	175.00±25.00^{a}	200±50.00^{a}	162.00±12.50^{a}	190±10.00^{a}	175.00±0.00^{a}	225.00±0.00^{a}
PCV (%)	55.50±2.50^{b}	45.50±1.50^{a}	48.50±2.50^{ab}	50.00±2.00^{ab}	48.00±2.00^{ab}	48.00±3.00^{ab}	49.50±4.50^{ab}
RBC (x10^{12}/L)	3.31±0.01^{a}	3.44±0.19^{a}	3.35±0.05^{a}	3.41±0.01^{a}	3.05±0.65^{a}	3.08±0.72^{a}	3.05±0.75^{a}
WBC (x10^{9}/L)	7.80±0.22^{a}	7.00±0.50^{a}	9.60±0.24^{a}	11.10±0.51^{a}	8.30±0.13^{a}	9.10±0.10^{a}	11.00±0.30^{a}
HB (g/dL)	15.75±0.35^{a}	15.75±0.35^{a}	16.85±0.5^{a}	16.85±0.35^{a}	17.80±0.60^{a}	15.75±0.75^{a}	15.55±1.65^{a}

In the first week, initial weight (g) of rats administered different concentrations of aqueous and methanolic extracts were not significantly ($P > 0.05$) different compared to the control. Only the PCV of rats given 50 mg/kg aqueous extract (45.50 ± 15) was significantly reduced when compared with control, (55.50 ± 2.20). PCV values of methanolic extract group were not significantly different when compared with the aqueous extract; the methanolic extract did not produce any significant change in PCV value. There was no significant change in RBC values of rats administered both extracts at ($P > 0.05$) and also when RBC values of extracts were compared with control. There was no significant change in the WBC of both aqueous and methanolic extracts when compared with control. Both extracts did not also differ significantly in their WBC counts at ($P > 0.05$). [1]Mean ± S.E values in a row for a given group of extracts compared to control with different superscripts are significantly ($P < 0.05$) different.

[2]The parameters stand for the following:

PCV- Packed cell volume RBC- Red blood cell count WBC- white blood cell count

HB- Haemoglobin count

Table 2: Changes in haematological parameters of rats given different concentrations of methanolic and aqueous extracts of *X. aethiopica* in Week 2.

	Control	Aqueous			Methanolic		
Parameters[2]	Distilled water	50 mg/Kg	100 mg/Kg	150 mg/Kg`	50 mg/Kg	100 mg/Kg	150 mg/Kg
Weight (g)	187.50±12.50^{a}	162.50±12.50^{a}	150.00±25.00^{a}	150.00±50.00^{a}	137.50±12.50^{a}	162.50±12.50^{a}	175.00±0.00^{a}
PCV (%)	69.50±0.50^{b}	51.00±12.00^{a}	58.00±4.00^{ab}	58.00±0.00^{ab}	64.00±1.00^{ab}	69.00±1.00^{b}	63.50±0.50^{ab}
RBC(x10^{12}/L)	2.70±0.10^{c}	2.50±0.10^{a}	2.60±0.20^{ab}	2.60±0.20^{a}	2.70±0.10^{abc}	2.85±0.10^{bc}	2.80±0.20^{abc}
WBC(x10^{9}/L)	5.70±0.30^{a}	8.40±0.10^{a}	8.50±0.49^{a}	8.10±0.25^{a}	6.10±0.27^{a}	6.60±0.42^{a}	7.00±0.10^{a}
HB (mg/dl)	15.95±0.55^{a}	14.15±0.55^{a}	17.25±1.45^{a}	16.05±4.65^{a}	17.05±0.55^{a}	17.45±0.55^{a}	17.25±1.45^{a}

[1]Mean ± S.E values in a row for a given group of extracts compared to control with different superscripts are significantly ($P < 0.05$) different.

In the second week, the weight of rats in control group increased but their weight did not differ significantly from those of rats administered aqueous and methanolic extracts. The weight of animals in all the groups showed no significant ($P > 0.05$) change. The PCV values of rats in control and methanolic group increased in Week 2 but no significant ($P > 0.05$) change was observed in the PCV values of these groups. Rats administered 50 mg/kg of aqueous extract of *X. aethiopica* significantly ($P < 0.05$) decreased in their PCV values compared with the control and with only PCV values of groups given 100 mg/kg methanolic extract. RBC values of methanolic extract group and control also increased in the second week. However, no significant ($P<0.05$) difference was seen in their RBC values. Compared with the control, 50 mg/kg and 150 mg/kg of aqueous extract produced RBC values that were significantly ($P<0.05$) decreased. The RBC values of aqueous extract groups did not differ from each other and also with methanolic extract group. No significant ($P > 0.05$) change was found in the WBC values of all groups. Except for Hb value of 50 mg/Kg aqueous extract, Hb values of all groups slightly increased, though they were all statistically similar.

Table 3: Changes in haematological parameters of rats given different concentrations of methanolic and aqueous extracts of *X. aethiopica* in Week 3

	Control	Aqueous		Methanolic			
Parameters[2]	Distilled water	50 mg/Kg	100 mg/Kg	150 mg/Kg`	50 mg/Kg	100 mg/Kg	150 mg/Kg
Weight (g)	222.50±37.50^{b}	200.00±25.00^{b}	165.00±15.00^{ab}	110.00±0.00^{a}	175.00±0.00^{ab}	202.50±22.50^{b}	210.00±0.00^{b}
PCV (%)	55.02±3.00^{a}	58.00±2.00^{a}	57.50±1.50^{a}	59.00±1.00^{a}	59.50±1.50^{a}	54.50±0.50^{a}	56.50±1.50^{a}
RBC(x10^{12}/L)	3.20±0.40^{a}	3.16±0.63^{a}	3.28±0.03^{a}	3.33±0.13^{a}	3.15±0.45^{a}	3.25±0.45^{a}	2.38±0.80^{a}
WBC(x10^{9}/L)	5.40±0.14^{a}	5.20±0.20^{a}	3.30±0.30^{a}	2.60±0.60^{a}	2.80±0.60^{a}	4.60±0.16^{a}	6.60±0.14^{b}
HB (mg/dl)	14.30±1.10^{ab}	11.55±2.35^{a}	14.30±0.70^{ab}	15.60±0.20^{ab}	16.10±0.00^{b}	14.65±0.75^{ab}	15.40±1.10^{ab}

[1]Mean ± S.E values in a row for a given group of extracts compared to control with different superscripts are significantly different ($P < 0.05$).

In the third week of administration of the aqueous and methanolic extracts of *Xylopia aethiopica*, the weight of rats administered 150 mg/kg aqueous extract significantly decreased compared to control and 100 mg/kg methanolic extract group. Weight of rats in other groups did not differ from the control and with each other significantly ($P > 0.05$). The PCV and RBC values of all the groups showed no significant ($P > 0.05$) difference. WBC showed significant ($P < 0.05$) increase with only 150 mg/kg methanolic group compared with other groups. The Hb value of the group administered 50 mg/kg aqueous extract significantly decreased compared to Hb value of the group given 50 mg/kg methanolic extract of *X. aethiopica* (16.10 ± 0.00). Hb values of all other groups were not significantly ($P > 0.05$) different.

Table 4: Changes in haematological parameters of rats given different concentrations of methanolic and aqueous extracts of *X. aethiopica* in Week 4

	Control	Aqueous			Methanolic		
Parameters[2]	Distilled water	50 mg/Kg	100 mg/Kg	150 mg/Kg	50 mg/Kg	100 mg/Kg	150 mg/Kg
Weight (g)	287.50±12.50^{c}	232.50±2.50^{a}	225.00±0.00^{a}	280.00±.00^{bc}	247.50±22.50^{ab}	270.00±10.00^{bc}	290.00±0.00^{c}
PCV (%)	43.50±7.50^{ab}	48.00±1.00^{abc}	41.00±0.00^{a}	59.00±0.00^{c}	53.00±4.00^{bc}	49.00±1.00^{abc}	39.00±0.50^{a}
RBC x10^{12}/L)	2.96±0.26^{a}	2.53±0.23^{a}	2.70±0.30^{ab}	2.63±0.25^{ab}	2.64±0.16^{ab}	3.40±0.40^{bc}	3.95±0.05^{c}
WBC(x10^{9}/L)	5.05±0.50^{c}	5.00±0.10^{a}	4.50±0.90^{a}	5.10±0.30^{a}	5.10±0.90^{a}	5.30±0.30^{a}	6.60±0.40^{b}
HB (mg/dl)	12.65±2.75^{a}	14.00±6.80^{a}	14.45±0.15^{a}	15.30±0.10^{a}	15.40±0.70^{a}	15.80±0.40^{a}	14.30±0.70^{a}

[1]Mean ± S.E values in a row for a given group of extracts compared to control with different superscripts are significantly different ($P < 0.05$).

In the fourth week, as shown in the Table above, the weight of rats in control group and those administered 150 mg/kg methanolic extract increased significantly ($P < 0.05$) when compared with other concentration groups. Also, rats in the 50 mg/kg aqueous group decreased in weight significantly ($P<0.05$) from the control, 150 mg/kg aqueous and 100 mg/kg methanolic groups. Comparing aqueous extracts and methanolic extracts, rats administered the 50 mg/kg and 100 mg/kg aqueous extracts decreased significantly ($P < 0.05$) compared to 100 mg/kg and 150 mg/kg methanolic extract groups. The PCV of the rats administered 150 mg/kg methanolic extract showed significant ($P < 0.05$) decrease when compared with that of 150 mg/kg aqueous extract group and 50 mg/kg methanolic extract group. The RBC values of the control group were significantly ($P < 0.05$) decreased compared with the higher doses of methanolic extract groups-100 mg/kg and 150 mg/kg respectively. Also, the WBC values of rats in the fourth week of administration of *Xylopia aethiopica* extracts (methanolic and aqueous) increased in all groups compared with the control group. However, Hb values of rats in the fourth week were statistically similar ($P > 0.05$) in all groups.

Table 5: Changes in haematological parameters of rats given different concentration of Methanolic and Aqueous extracts of *X. aethiopica* in Week 5

	Control	Aqueous			Methanolic		
Parameters[2]	Distilled water	50 mg/Kg	100 mg/Kg	150 mg/Kg`	50 mg/Kg	100 mg/Kg	150 mg/Kg
Weight (g)	240.00±15.00^{ab}	252.50±27.50^{ab}	190.00±40.00^{a}	290.00±0.00^{b}	265.00±5.00^{ab}	212.50±12.50^{a}	207.50±17.50^{a}
PCV (%)	45.00±1.00^{a}	48.00±0.00^{ab}	50.50±1.50^{ab}	53.00±1.00^{b}	55.00±2.00^{b}	49.00±5.00^{ab}	44.50±0.50^{ab}
RBC(x10^{12}/L)	3.05±0.10^{ab}	2.56±0.06^{ab}	2.65±0.05^{ab}	2.90±0.10^{ab}	3.15±0.25^{b}	2.65±0.45^{ab}	2.15±0.15^{a}
WBC(x10^{9}/L)	5.90±0.10^{c}	5.25±0.25^{ab}	6.10±0.10^{abc}	6.25±0.25^{a}	5.80±0.20^{abc}	5.15±0.35^{ab}	6.25±0.35^{bc}
HB (mg/dl)	10.95±0.75^{a}	14.50±0.20^{b}	14.30±0.70^{b}	13.90±0.70^{b}	12.70±0.40^{ab}	13.25±0.05^{ab}	12.50±1.10^{ab}

[1]Mean ± S.E values in a row for a given group of extracts compared to control with different superscripts are significantly different ($P < 0.05$).

In the fifth week, as shown in the Table above, there was a significant decrease ($P < 0.05$) in the weight of rats administered 100 mg/kg aqueous extract when compared with the higher dose of aqueous extract, 150 mg/kg. The PCV of rats administered 150 mg/kg aqueous extract and 50 mg/kg methanolic extract were significantly ($P < 0.05$) increased when compared with the control group. Comparing aqueous extract and methanolic extracts, both extracts did not differ significantly in their PCV values ($P > 0.05$).

When the RBC values of the rats administered different concentrations of aqueous extract were compared with the control group, there was no significant ($P > 0.05$) difference. The Hb of all the aqueous extract groups were significantly ($P < 0.05$) increased compared to the Control.

Table 6: Changes in haematological parameters of rats given different concentrations of methanolic and aqueous extracts of *X. aethiopica* in Week 6

	Control	Aqueous			Methanolic		
Parameters[2]	Distilled water	50 mg/Kg	100 mg/Kg	150 mg/Kg	50 mg/Kg	100 mg/Kg	150 mg/Kg
Weight (g)	230.00 ± 0.00[a].	215.00±35.00[a]	200.00±0.00[a]	225.00 ±0.00[a]	265.00±15.00[a]	237.50 ± 37.50[a]	257.50±32.50[a]
PCV (%)	4750 ± 0.50[a]	42.00 ± 0.00[a]	45.50±2.50[a]	43.50 ± 7.50[a]	43.50 ± 1.00[a]	44.50 ± 0.50[a]	41.00 ± 3.00[a]
RBC(x10^{12})	3.05 ± 0.50[a]	2.85 ± 0.35[a]	2.70 ± 0. 00[a]	2.70 ±0.40[a]	2.55 ± 0.15[a]	2.35 ± 0.15[a]	3. 00 ± 0.50[a]
WBC(x10^{9}/L)	5.45 ± 0.50[ab]	4.50 ± 0.50[a]	5.60±0.16[ab]	5.80 ± 0.10[a]	6.10 ± 0.19[ab]	6.50 ± 0.15[a]	5.90 ± 0.30[a]
HB (mg/dl)	13. 30±0.30[b]	11.00 ± 0.40[ab]	12.30±0.20[ab]	11.10 ± 0.30[a]	12.85 ± 0.05[b]	12.80 ± 0.20[b]	11.35 ± 0.75[a]

In the sixth week post administration of extract, result of effects is as shown in Table above. There was no significant ($P > 0.05$) change in the weight of rats in all the groups.

The PCV, RBC and WBC values of all groups showed no significant ($P > 0.05$) difference.

There was significant ($P < 0.05$) decrease in the Hb values of rats administered 50 mg/kg and 150 mg/kg aqueous extracts respectively when compared to the control group. However, when methanolic extract was compared to the control, rats administered 150 mg/kg showed significant ($P > 0.05$) decrease and also with 50 mg/kg and 100 mg/kg methanolic extract group ($P < 0.05$). When both extracts were compared there was significant difference in their Hb.

4.0 DISCUSSION

The present study has shown a non dose-dependent decrease on weight of albino rats by extracts of *Xylopia aethiopica*. There were significant decreases in weights of experimental rats, an observation found to be consistent with the report of Chike and Adienbo[20]

who showed that administration of aqueous extract of *X. aethiopica* on guinea pigs resulted in loss of body weight. The decrease in the weight could be attributed to the hypolipidemic property of the extract [21]

The study revealed that for the PCV of rats, initially in weeks 1-2, there were decreases in the PCV of rats administered with lower dose of aqueous extract of *X. aethiopica* (50 mg/kg) but in week three there was no significant effect, which could be an indication of adjustment of the animals to the extract. This initial reduction in PCV level could be also as a result of loss of appetite by the animals occasioned possibly by the bitter nature of the extracts. This becomes more likely since in the fourth to fifth week, higher dose of aqueous extract (150 mg/kg) showed significant increases in the PCV values compared to the control. This shows that a prolonged use of higher dose of aqueous extract of *X. aethiopica* can actually stimulate haemopoiesis in rats. Nnodim et al[22] had observed that there was a significant increase in PCV of rats that received aqueous extract of *X. aethiopica* and equally associated this with high iron content of *X. aethiopica* and its ability to stimulate haemopoiesis. This stimulation was seen more in the aqueous extract than the methanolic extract.

RBC of rats showed a significant increase with higher doses of methanolic extract at week four respectively, compared to control. The high levels of RBC may probably be associated with the high iron content of *Xylopia aethiopica*[21]. Methanolic extracts seem to perform better in increasing RBC than aqueous extract of *Xylopia aethiopica* in this study.

The white blood cell (WBC) count of rats fed *X. aethiopica* in this study showed no definite trend. However it was revealed that by the 3rd Week of administration of 150 mg/kg of methanolic extract, had an increasing effect on white blood cell count of rats, this decreased in Week 4. The findings of the present study is in agreement with the work of Taiwo et al[23] who reported elevated level of WBC and neutrophil in rats given extract of *X. aethiopica*. These findings thus validate the traditional use of the extract as a tonic and an immune booster. The significant increase in the level of WBC count in the treated animals could be due to the direct effect of the extract on haemopoietic activity in these animals as earlier observed. The crucial role of WBC in defending the body against infection and tissue damage is well known and as such, immune boosters are usually recommended to strengthen and harmonize degenerative body systems and assist the immune system to fight invading pathogens[7 24 25]. The Hb showed significant increases in all the different

concentrations of aqueous extract compared to the control in Week 5, although no significant change was found with the methanolic extract groups. This is an indication that prolonged use of *X. aethiopica* fruits can have increasing effect in the Hb of rats. Haemoglobin synthesis is normally increased by the consumption of plant foods due to their high content of minerals and vitamins[26] that may stimulate synthesis of globin component of haemoglobin. The increase in haemoglobin may also be associated with the increase in the absorption of iron content of the extract by the rats. The increase might be speculated to be due to the immunopotentiating effect of the extract [21].

5.0 CONCLUSION

The significant decrease in the weight of treated rats in the present study could be beneficial in the management of obesity. The significant increases in the hematological profile: Packed Cell Volume, Red Blood Cell count, White Blood Cell count and Haemoglobin concentration may be associated with the high iron content of the extracts and the ability of their iron to stimulate haemopoiesis.Results generally suggest that *Xylopia aethiopica* may have immune boosting effect on rats.

6.0 ETHICAL DISCLAIMER

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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