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Original Article

HAEMATOLOGICAL INDICES AND WEIGHT EFFECT IN FEMALE WISTAR RATS TREATED WITH DOSE-DEPENDENT AQUEOUS EXTRACT OF *Raphia hookeri* FRUIT MESOCARP

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ABSTRACT

Background: Research aimed to evaluate haematological indices and weight effects in female wistar rats treated with dose-dependent aqueous Extract of Raphia Hookeri Fruit Mesocarp. *Raphia hookeri* and its therapeutic potential warranted this scientific investigation
Methods: 28 female Wistar rats weighing 130g to 200g, were grouped into 4 groups, Group 1 as control fed with feed and water, Group 2 received 1000 mg/kg, Group 3, 2000 mg/kg, and Group 4 3000 mg/kg body weight daily for 28 days. Animals were sacrificed after the treatment period, blood samples were collected, and erythrocyte count, MCV, MCH, MCHC, and platelet counts were analyzed using standard haematological techniques. Statistical analysis was conducted with SPSS version 21.0, and results were expressed mean ± standard error of the mean (SEM), $p<0.05$ considered statistically significant.
Results: Results showed erythrocyte counts of 5.80 ± 0.12 in control group, a significant decrease in treated groups 2, 3 and 4. MCV levels increased significantly across treatment groups, control at 72.00 ± 1.73, compared to Groups 2, 3, and 4, respectively. MCHC values decreased significantly in treated groups, 412.00 ± 4.04 for control. Reduced TWBC values for group 1 to 4, Neutrophil for group 1 to 4, Lymphocytes for group 1 to 4, Eosinophils for group 1 to 4 and Monocytes for group 1 to 4. Platelet

counts showed dose-dependent decrease, 250.00 ± 1.15 in control and significantly lower counts of 120.00 ± 2.89, 100.00 ± 1.73, and 94.00 ± 2.31 in Groups 2, 3, and 4, respectively.
Conclusion: Higher doses may significantly impact erythrocyte leukocytes and platelet parameters, suggesting potential haematological risks as such moderation is recommended.

INTRODUCTION

In West Africa, most especially Nigeria, virtually all the parts of the plant have found relevance in functional uses, socio-cultural activities, and as a remedy for several diseases including diabetes (Dada et al., 2017). It is commonly found in West Africa and in abundance particularly in Emoh community in Okpeden clan in ward 8, Abua/Odual Local Government, Rivers state, Niger Delta region, Southern Nigeria and usually grows up to 12m high. Scientific research about *Raphia hookeri* has received greater attention in recent times, particularly in Nigeria (Egbono et al; 2024). This plant species belonging to the Arecaceae family (palms) have been extensively used as source of livelihood in different cultures of the world (Gruca et al., 2015). They are a viable source of medicine and raw materials for the construction and beverage industries (Gruca et al., 2015). The plant is also monocarpic in nature, in that, it produces inflorescences that flower, set seeds and die off once the fruits are matured. The most economically important and popular use of *raphia hookeri* is the production of fermented wine (Oguro in Yoruba language), where the sugary whitish or colorless sap from the stem is fermented (Umerie, 2000). The sweet taste of the wine has been attributed to the presence of sucrose, glucose, xylose, raffinose, and lactose (Obahiagbon and Osagie, 2007; Erukainure et al., 2019). Also, the root, stem, leaves, fruit extracts, wine product are rich sources of macro and micronutrients as well as phytochemicals of pharmacological importance (chemical Obahiagbon and Osagie, 2007; Dada et al., 2017; Ibegbulem et al., 2013). The presence of these biological constituents and other diverse compounds in the plant could be responsible for its health benefits. The fruits of raphia hookeri contain an important part called pulp or mesocarp which is considered edible when boiled. In addition the pulp is used as a bitter flavouring in meals. Due to its hypothesized medicinal qualities, the pulp is used as a form of native medicine in some certain parts of Africa (Liu, 2004 and Altiok, 2010). The major economic products of raffia palm are: wine, raphia fibre, and pulp for paper production (Irvine, 1961 and Otedoh et al., 1972).

The fruit is large, cone-shaped with a single hard nut having an outer layer of rhomboid-triangular and overlapping reddish brown scales. Between this outer layer of scales and the very hard seed is a yellow, mealy, oil-bearing mesocarp or pulp. Raffia oil is very similar to palm oil in chemical composition and is used for cooking, as liniment, as lubricant, for lighting and in cosmetics; and could be used for making soap and margarine (Otedoh et al., 1974).

The pulp is normally consumed with boiled, sliced cassava and may be pounded with other plant substances and also used as fish poison. The root extract of raphia palm is used in traditional medicine for the treatment and prevention of several diseases. The cool root extract is normally given to infant with stomach pain. Again, the effect of root extract on the plasma level of ethanol has been observed in acute and chronic intoxication in human being. There are claims by traditional medicine practitioners that the root extracts of *Raphia hookeri* can be used in the treatment of alcoholic intoxication in man (Joo et al., 1984). Haematological indices include Erythrocyte count, Leucocyte and differentials, Platelet counts, mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC. Certain health conditions can affect the haematological indices in the body, an indicator of disease. *Raphia hookeri* has garnered significant interest for its wide-ranging therapeutic properties. Known for its potential in managing ailments such as inflammation, cardiovascular issues, and liver conditions, *Raphia hookeri* is utilized in various indigenous treatments across West and Central Africa (Egbono *et al.,* 2023; Altiok *et al.,* 2010). This interest reflects a broader trend toward plant-based medicines as complementary therapies to conventional medical practices, highlighting *Raphia hookeri*'s role in holistic health management (Abimbola *et al.,* 2018). Moreover, as modern science increasingly investigates the physiological impacts of *Raphia hookeri*, attention has turned to its potential benefits on blood health, particularly in enhancing erythrocyte indices and platelet counts (Egbono *et al.,* 2023), which are essential markers

in hematology and overall health assessment. Erythrocyte indices are key indicators of red blood cell (RBC) health and function, including mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), and mean corpuscular haemoglobin concentration (MCHC) (Rodak *et al.*, 2016). Each of these indices provides critical insights into the physiological status of red blood cells. MCV, the average volume of red blood cells, helps classify anaemia as either microcytic (smaller than normal), normocytic (normal size), or macrocytic (larger than normal) (Hoffbrand *et al.*, 2011). Deviations in MCV can reveal nutritional deficiencies—such as those of iron, folic acid, or vitamin B12—or chronic diseases that impact RBC development and lifespan. MCH and MCHC provide further insights into haemoglobin content and concentration within erythrocytes, respectively. MCH measures the average amount of haemoglobin per red blood cell, while MCHC assesses the concentration of haemoglobin in a given volume of packed erythrocytes. These metrics are useful in identifying several types of anaemia and evaluating oxygen-carrying capacity, which is essential for maintaining cellular energy and health throughout the body (Roberts & Fulwood, 2018). A healthy erythrocyte index reflects sufficient oxygen transport to tissues, while abnormalities may indicate conditions such as iron deficiency anaemia (often microcytic), folate or B12 deficiency anaemia (often macrocytic), and hereditary or acquired disorders that influence RBC morphology (Hoffbrand et al., 2011). The significance of these indices extends beyond diagnosing anaemia, as they are also valuable markers for assessing overall health and managing chronic conditions influenced by oxidative stress. Oxidative stress, known to shorten erythrocyte lifespan and impair erythrocyte functionality, is especially impactful in conditions like diabetes, cardiovascular disease, and chronic inflammation (Sies, Berndt, & Jones, 2017). Studies show that the antioxidants found in *Raphia hookeri*, such as vitamins C and E, flavonoids, and phenolic compounds, can help protect erythrocytes from oxidative damage.

By stabilizing erythrocyte indices, these antioxidants can potentially mitigate oxidative stress, thereby preserving erythrocyte stability, improving oxygen transport, and enhancing cellular health (Hebbel *et al.*, 1982; Egbono *et al.*, 2023). Platelets, or thrombocytes, play a crucial role in blood clotting and wound healing, as they are responsible for forming clots to prevent excessive bleeding (Harrison & Keeling, 2005). A complete blood count typically includes a platelet count, which provides essential information on coagulation capacity.

An ideal platelet count helps maintain a delicate balance between clot formation and breakdown, ensuring that the blood remains fluid while being capable of forming clots when necessary. Abnormal platelet counts can lead to various health complications: thrombocytopenia (low platelet count) is associated with bleeding disorders, while thrombocytosis (high platelet count) can lead to an increased risk of thrombosis, which may result in cardiovascular events such as stroke or myocardial infarction (Schulman & Kearon, 2005). Oxidative stress can negatively impact platelet function, making antioxidants from plant sources like *Raphia hookeri* particularly valuable. By combating oxidative damage, *Raphia hookeri*'s antioxidant-rich profile may help preserve platelet function, thus aiding in the prevention of abnormal clotting or bleeding tendencies (Tao *et al.*, 2019). Studies suggest that antioxidants like vitamins C and E in *Raphia hookeri* contribute to platelet stability and support cardiovascular health, as oxidative damage to platelets is linked to conditions like atherosclerosis and thrombosis (Sies *et al.*, 2017). This protective effect of *Raphia hookeri* makes it a promising natural adjunct in managing conditions related to platelet function and cardiovascular health (Oluwaniyi *et al.*, 2014).

The importance of these blood health parameters—erythrocyte indices and platelet counts—is well-established in medical practice, where they provide crucial insights into immune health, anaemia, coagulation disorders, and overall physiological status (Roberts & Fulwood, 2018). Studies on *Raphia hookeri* have primarily focused on its lipid profile effects, vitamin and phytochemical composition, and toxic elements (Ogbuagu, 2008; Bassey, 1985). However, targeted research into its impacts on erythrocyte indices and platelet counts remains limited, revealing a promising avenue for future studies that could enhance applications in both hematology and the health sector. Despite the abundance of natural remedies available in Nigeria, including the *Raphia hookeri* plant, these resources remain significantly underutilized. This lack of widespread knowledge about their medicinal properties

contributes to the low consumption of these natural treatments. Many Nigerians, regardless of socioeconomic status, tend to rely on expensive synthetic drugs, unaware that affordable and accessible alternatives like *Raphia hookeri* can offer substantial health benefits, including the improvement of blood cell parameters and effect on weight. The underuse of these natural remedies highlights a gap in awareness and education, underscoring the need for greater recognition of *Raphia hookeri* and its therapeutic potential warranted this scientific investigation.

MATERIALS

Syringe, Hand Gloves, Cages, Dissecting Blade, Dissecting Board, Permanent Marker, Animal Feeds, Water, Chloroform, EDTA Bottles, Cannula, matured female Wistar rats, Lab coats, Disinfectants, Dry saw dust etc.

Animal Preparations

A total of twenty (28) healthy female Wistar rats, weighing between 130g and 200g, were utilized for this study. These rats were housed in the Experimental Pharmacology and Toxicology Animal House of the Faculty of Pharmaceutical Sciences at the University of Port Harcourt, Nigeria. The animals were kept in a well-ventilated environment with optimal humidity and temperature conditions, and a natural light-dark cycle. They were provided with unrestricted access to food and water.

Acclimatization of Animals

After identification, the animals were weighed using a precise weighing balance. They were then housed in clean plastic cages for a period of two weeks. This acclimatization period was designed to ensure the animals adjusted to the environmental conditions of the Animal House, which included factors such as temperature, humidity, and light-dark cycles.

Experimental Extract and Preparation

The extract of *Raphia hookeri* fruit pulp was utilized for the experiment. The preparation of the extract was carried out using the maceration method. Initially, the fruit pulp was carefully air-dried to avoid degrading the active ingredients. After drying, the pulp was thoroughly crushed and then placed in a maceration jar for soaking.

Approximately 1000 grams of the dried pulp were mixed with 2000 ml of water. This mixture was allowed to stand for a period of 72 hours, during which it was continuously agitated to maximize the extraction yield. Following this maceration period, the mixture was filtered to separate the solid residues from the liquid extract. The obtained filtrate was then transferred to a water bath, where it was heated to a temperature of 65 degrees Celsius to evaporate the liquid content. This evaporation process concentrated the extract. After the evaporation was completed, the final weight of the extract was measured. The concentrated extract was then stored properly for subsequent use in the experimental procedures.

Study Design

A total of twenty-eight healthy female Wistar rats were used for this study. The rats were divided into four groups: a control group consisting of 7 animals and three experimental groups with 7 animals each. Following a 14-day acclimatization period in the Experimental Pharmacology and Toxicology Animal House of the Faculty of Pharmaceutical Sciences at the University of Port Harcourt, Nigeria, the experimental groups (Groups 2, 3, and 4) were administered the extract for 28 days.

Sample Collection

The *Raphia hookeri* fruit pulp used for this study was purchased from the *Ayeezi* local market in Abua/Odual LGA, Rivers State, Nigeria.

Mode of Administration of Extract

Aqueous pulp extract of *Raphia hookeri* was administered orally in low, medium, and high doses daily for 28 days. During this period, the following doses were given to each group, except the control group.

The lethal dose (LD50) of the aqueous pulp extract of *Raphia hookeri* fruit was calculated using Lorke's method, with 5000 mg/kg body weight of female Wistar rats being established as the maximum. Therefore, the female Wistar rats were not given doses exceeding 5000 mg/kg body weight:

- Group 1 (Control Group): Received standard animal feed and water.
- Group 2 (Low dose): Received 1000 mg/kg body weight of the extract.
- Group 3 (Medium dose): Received 2000 mg/kg body weight of the extract.
- Group 4 (High dose): Received 3000 mg/kg body weight of the extract.

Analysis of sample blood cell parameters

Estimation of the erythrocyte indices

Materials: Microscope and Slide

Procedures:

- Place a small drop of blood on a clean glass slide.
- Use another slide to spread the drop by holding it at a 30° – 45° angle and swiftly moving it across the first slide to create a thin smear.
- Allow the smear to air dry.
- Fix the cells by dipping the slide in methanol.
- Stain the smear using a Romanowsky stain (e.g., Wright-Giemsa stain). This process will make the erythrocytes more visible under the microscope.
- Place the stained slide under the microscope.
- Start with a low magnification to locate the optimal area where the cells are evenly spread and not overlapping.
- Switch to a higher magnification (usually 100x with oil immersion) to closely examine the erythrocytes.

Estimation of mean corpuscular volume (MCV)

- Use an ocular micrometre calibrated with a stage micrometre to measure the diameter of several erythrocytes.
- Measure the diameter of at least 20-30 erythrocytes to get a representative sample.
- Use the obtained diameter to calculate the mean corpuscular volume using the following formula:

$$MCV = \frac{4}{3}\pi r^3, \text{ where r = diameter} \div 2.$$

Estimation of mean corpuscular haemoglobin (MCH)

- Evaluate the colour of the erythrocytes. Normochromic cells (normal haemoglobin content) will have a pinkish red colour. Hypochromic cells (low haemoglobin content) will appear paler with a larger central pallor.
- Using the colour of the erythrocyte of a known value of haemoglobin, compare the haemoglobin contents of the viewed erythrocytes to estimate the mean corpuscular haemoglobin.

Estimation of mean corpuscular haemoglobin concentration (MCHC)

- Estimate the hematocrit in the sample using known values as reference.
- Calculate the MCHC using $MCHC = \frac{Hb}{Hct} \times 100$, where Hb is the MCH, and Hct is the hematocrit value.

Estimation of erythrocyte shape

- Observe normal erythrocytes.
- Identify erythrocytes with shapes differing from the normal.
- Estimate the proportion of the abnormally shaped cells.

- Note the distribution of the abnormally shaped cells.

Determination of White blood cell parameters

We have the following parameters;

- Total white blood cell count
- White blood cell differential count
- Neutrophils
- Eosinophils
- Basophils
- Lymphocytes
- Monocytes

White Blood Cell Count

Blood was drawn to exactly 0.5 mark in the pipette by using gentle suction on the mouth piece. The blood column was free of air bubbles with the excess blood from the outside of the pipette wiped off. This was done to avoid transfer of cells to the diluting fluid.
Add 0.02ml of blood to 0.38 ml of diluting fluid,
Charge the improved Neubquer counting chamber carefully with the well mixed diluted blood. Now the all settle in a moist chamber for 3-5 minutes using 10× objective of the microscope, locate the four large corners square area 1, 2, 3, and 4. The area of these square is $4mm^2$. Check that the cells are evenly distributed. Count the total number of the white cells in four large corners square in the same pattern ascribed for the red cell count.
Multiple what you have got from the square area 1, 2, 3, and 4 by 50?
E.g : 40×20×10×30 =100×50 =500 (wbc = 5•0 g/c)

White Blood Cell Differential Count

For WBC Differential count we have the following
The differential count is expressed as percentage of the total number of cells counted

Procedure when using Automated Hematological Analyzer.

1. The machine was switched on and allowed to warm for 15 minutes.
2. It was allowed to undergo auto calibration.
3. The probe was allowed to come out automatically.
4. The reagents were aspirated automatically to various chamber within the machine.
6. The diluent reagents dilute the sample, the lyse lyses the cells while E-z cleansed all the chamber.
7. The whole blood was thoroughly mixed and aspirated via the probe.
8. The probe automatically exit inside the machine, all the cells were counted automatically.
9. The results were displayed at the O.D (optical density) and the results were printed out accordingly**.**

Estimation of Platelet Count

Materials: Microscope and Slide

Procedures:

- Place a small drop of blood on one end of a glass slide.
- Use another slide to spread the drop by holding it at a 30–45-degree angle and dragging it across the slide to create a thin smear.
- Allow the smear to air dry before staining.
- Stain the dried smear using a suitable stain like Wright's or Giemsa stain.
- Rinse gently with distilled water and let it air dry.

- Place the slide on the microscope stage and focus on the stained smear using the low-power objective to locate areas with a good distribution of cells.
- Switch to a higher magnification (e.g., 100x oil immersion objective) to count the platelets.
- Use the high-power objective to examine fields of view. Count the number of platelets in multiple high-power fields (HPFs) to get an average count.
- Platelets are typically smaller than erythrocytes and appear as tiny, light-staining fragments.
- Estimate the count based on the number of platelets per field of view and the average number counted.

Statistical Analysis

The data collected from the current study were analyzed using the Statistical Package for Social Sciences (SPSS) software, specifically version 21.0. To determine statistical significance, we employed one-way analysis of variance (ANOVA) followed by a post-hoc multiple comparison test to identify significant differences between groups. A P value of less than 0.05 ($P<0.05$) was used as the threshold to denote statistical significance. All results were reported as mean values with their corresponding standard error of the mean (SEM), providing a measure of the variability around the mean estimates.

RESULTS

The results of the study are presented in tables and charts and interpreted accordingly.

Table 1: Effect of administration of aqueous pulp extract of *Raphia hookeri* fruit *(*APERHF) on Some Haematological Parameters in female Wistar rats

Group and Treatment	Erythrocyte ($X10^{12}/L$)	MCV (fL)	MCH (pg)	MCHC (g/L)	Platelet count ($X10^{9}/L$)
Group 1: Control Group	5.80 ± 0.12	72.00 ± 1.73	30.33 ± 1.45	412.00 ± 4.04	250.00 ± 1.15
Group 2: Low Dose treated (1000mg/kg b.w APERHF)	5.00 ± 0.58	110.33 ± 2.60 **a**	30.00 ± 0.58	272.00 ± 1.15 **a**	120.00 ± 2.89 **a**
Group 3: Medium Dose treated (2000mg/kg b.w APERHF)	4.40 ± 0.17 **a**	159.00 ± 2.31 **a, b**	30.00 ± 1.15	191.00 ± 2.31 **a, b**	100.00 ± 1.73 **a, b**
Group 4: High Dose treated (3000mg/kg b.w APERHF)	4.80 ± 0.12	125.00 ± 1.15 **a, b, c**	29.00 ± 1.15	233.00 ± 1.73 **a, b, c**	94.00 ± 2.31 **a, b**

Table 2: Effect of administration of aqueous pulp extract of *Raphia hookeri* (APERH) on Leucocyte Parameters in female Wistar rats

Group and Treatment	Total White blood cell (*10^9/1)	Neutrophil (%)	Lymphocyte (%)	Eosinophil (%)	Monocyte (%)
Group 1: Control Group	11.40 ± 0.29	21.00 ± 1.73	70.00 ± 1.73	4.00 ± 0.57	5.00 ± 0.58
Group 2: Low Dose treated (1000mg/kg b.w APERH)	12.00 ± 1.15	55.00 ± 1.73 [a]	40.00 ± 1.73 [a]	1.33 ± 0.33 [a]	4.00 ± 0.57
Group 3: Medium Dose treated (2000mg/kg b.w APERH)	14.90 ± 0.17 [a, b]	69.00 ± 2.31 [a, b]	20.00 ± 1.15 [a, b]	4.00 ± 1.15 [b]	7.00 ± 0.58 [a, b]
Group 4: High Dose treated (3000mg/kg b.w APERH)	7.80 ± 0.12 [a, b, c]	78.00 ± 2.30 [a, b, c]	18.00 ± 0.58 [a, b]	2.00 ± 0.58	2.00 ± 0.57 [a, b, c]

Table 3: Effect of administration of aqueous pulp extract of *Raphia hookeri fruit (*APERHF) on Percentage Change in Body Weight in female Wistar rats

Group and Treatment	Percentage Change in Body (%)
Group 1: Control Group	37.43 ± 20.01
Group 2: Low Dose treated (1000mg/kg b.w APERHF)	63.56 ± 5.59
Group 3: Medium Dose treated (2000mg/kg b.w APERHF)	59.97 ± 7.11
Group 4: High Dose treated (3000mg/kg b.w APERHF)	18.17 ± 3.34 [b, c]

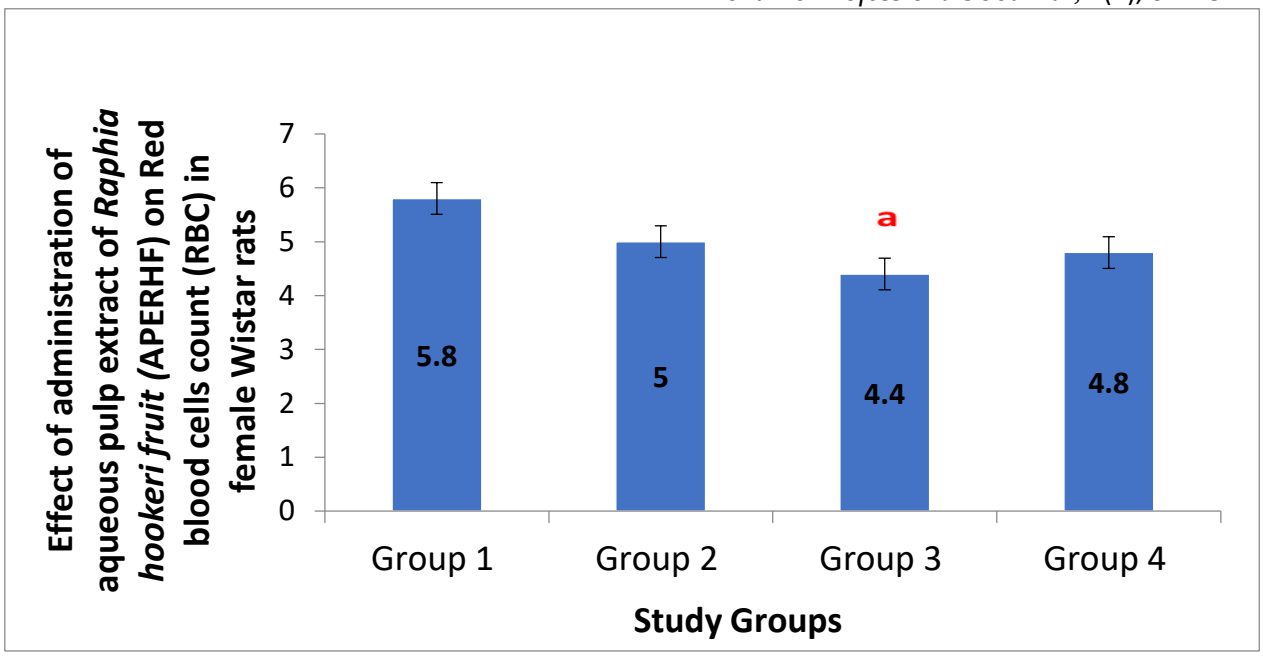
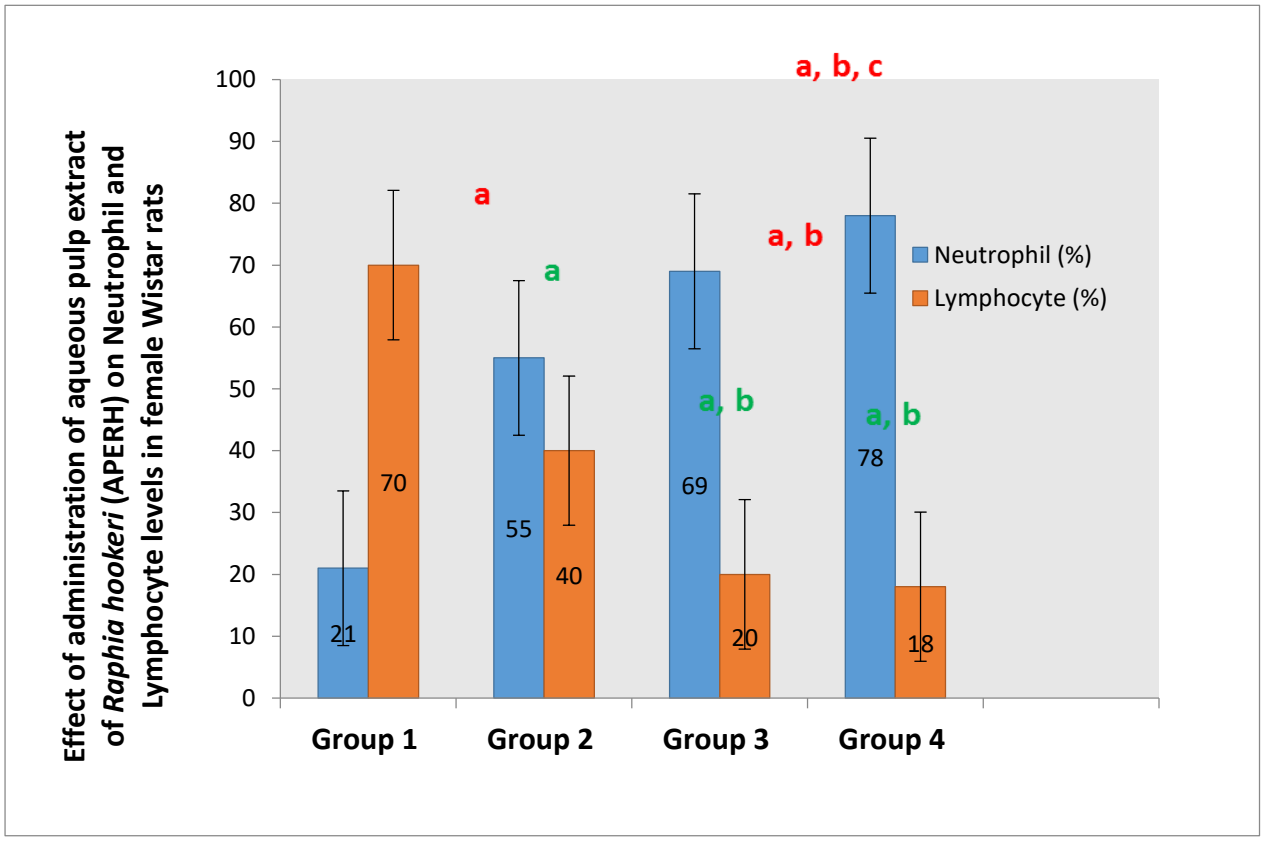
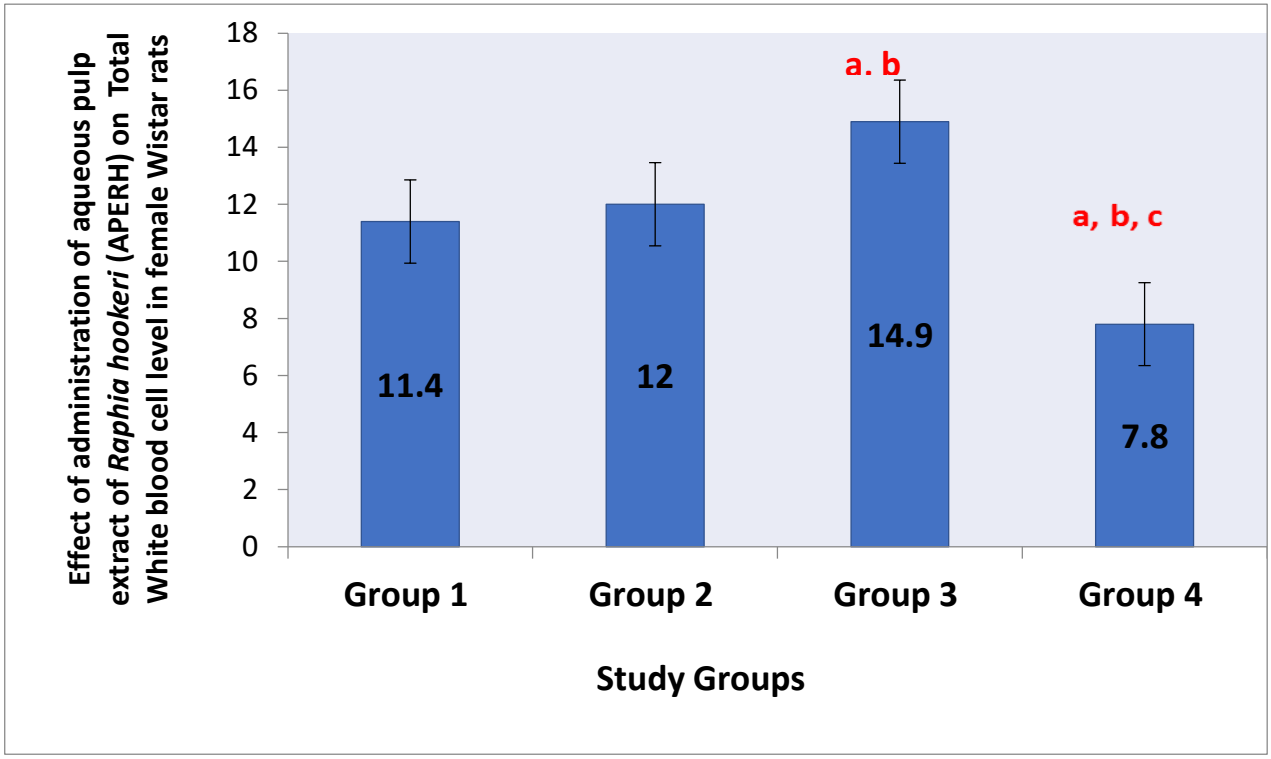
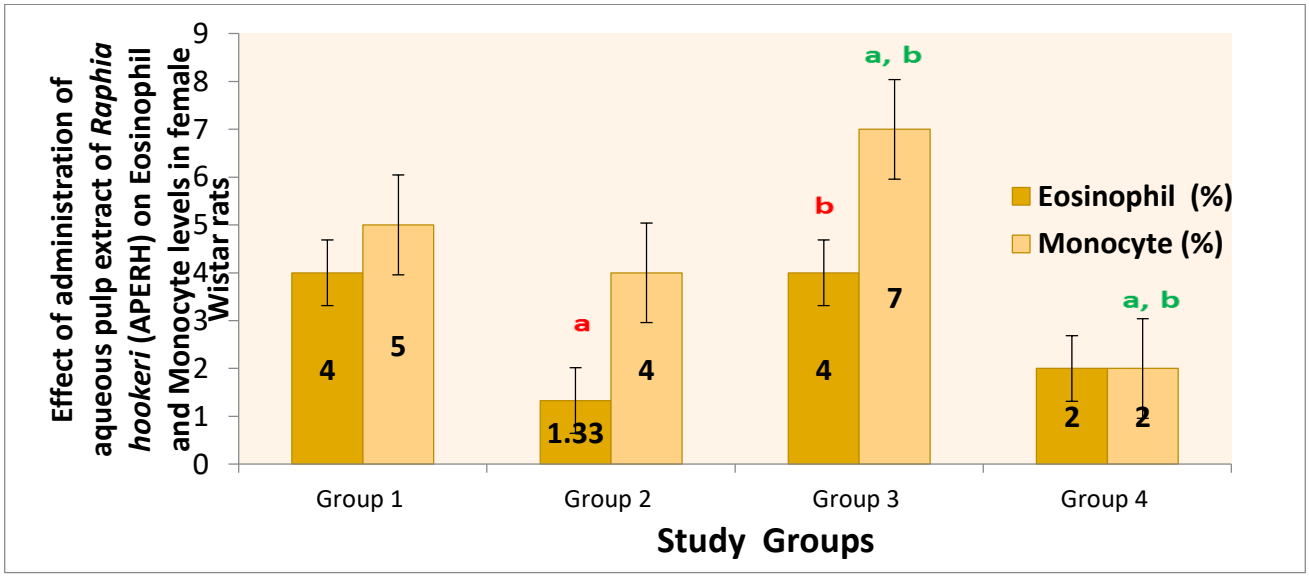
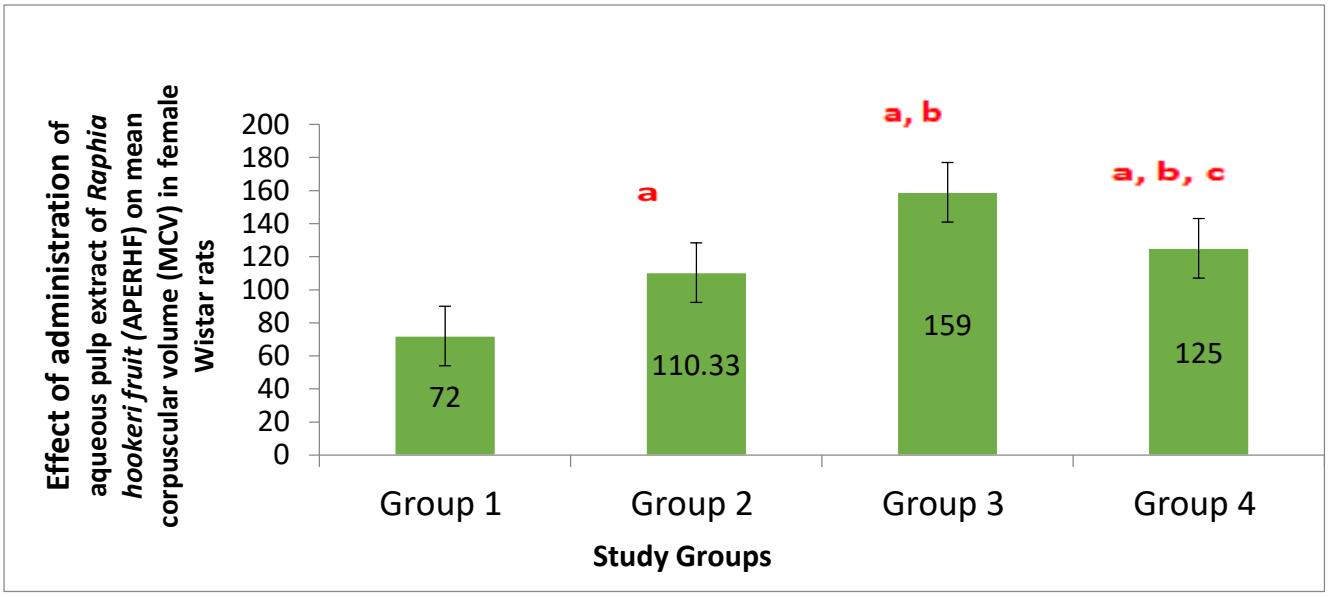


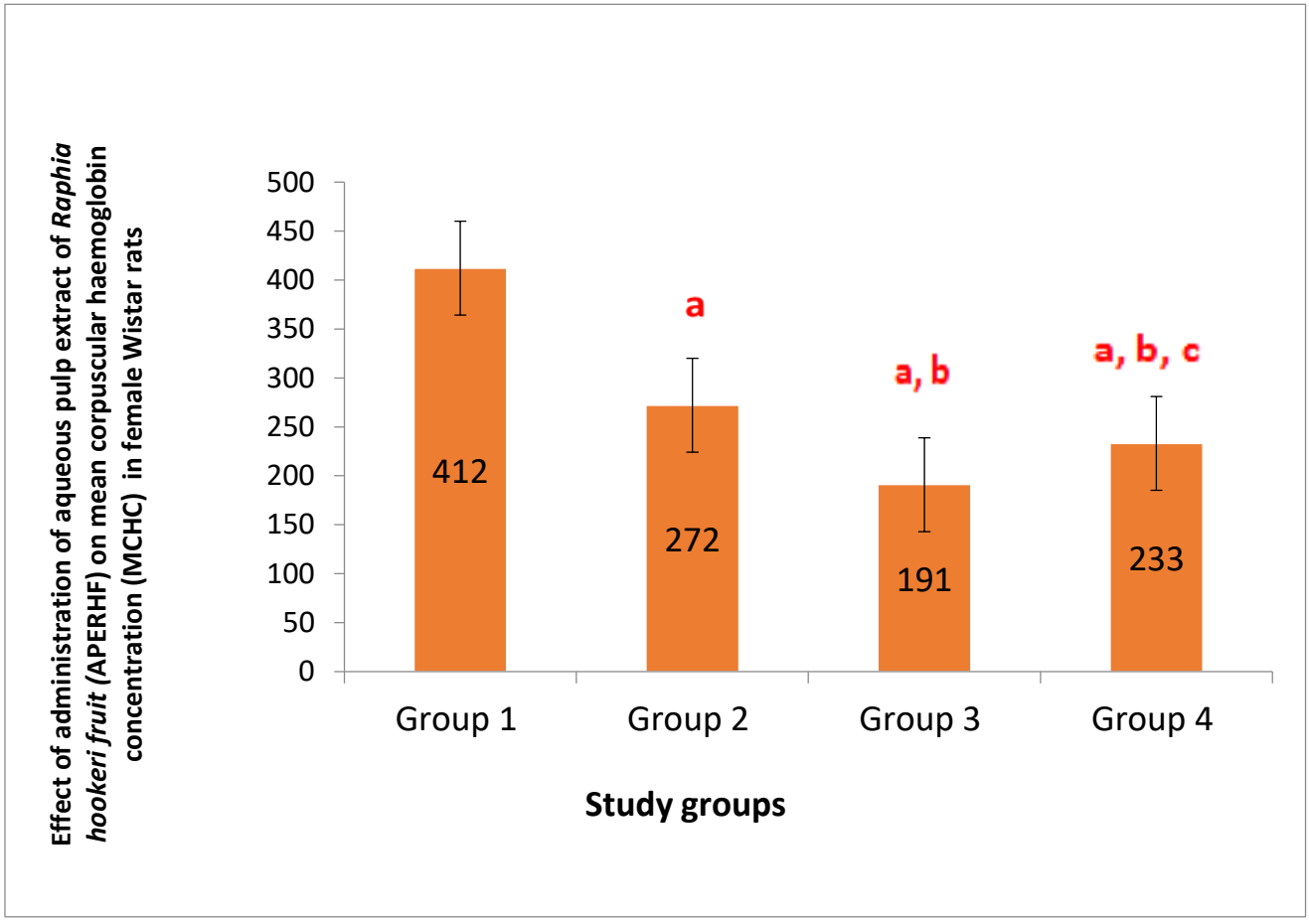
Figure 1: Effect of administration of aqueous pulp extract of *Raphia hookeri* fruit *(*APERHF) on erythrocyte count in female Wistar rats

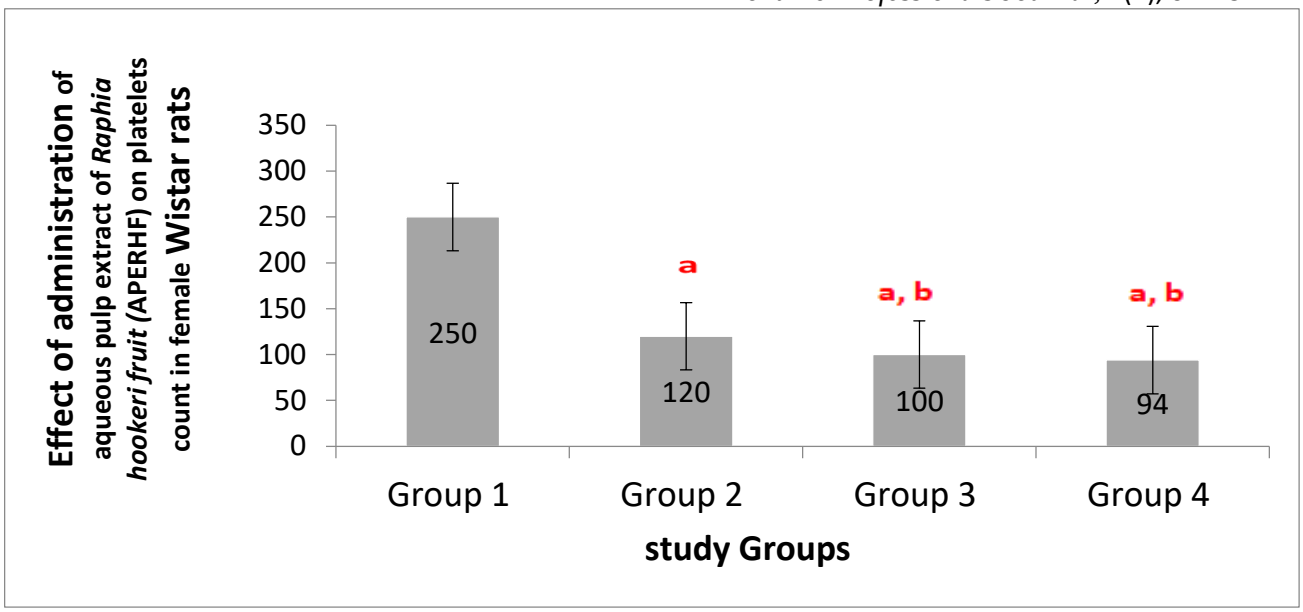


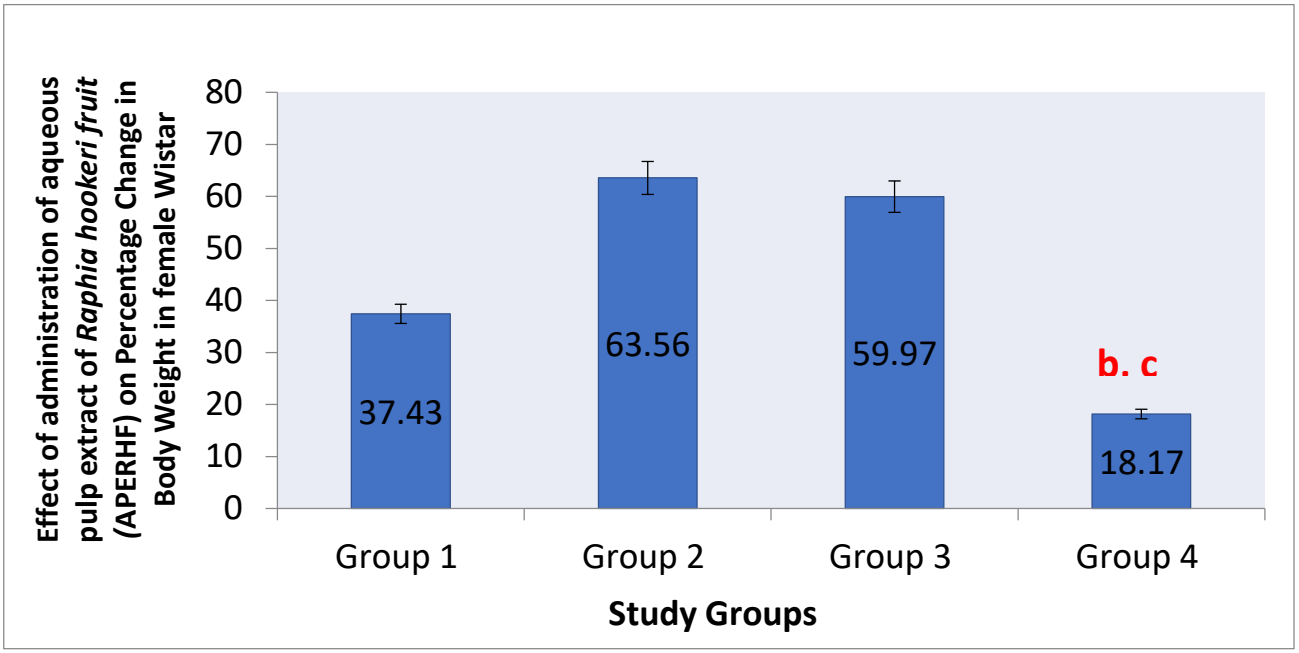

Effect of administration of aqueous pulp extract of *Raphia hookeri* (APERH) on Total White blood cell level in female Wistar rats
18
16
14
12
10
8
6
4
2
0
a. b
a, b, c
11.4
12
14.9
7.8
Group 1
Group 2
Group 3
Group 4
Study Groups


Effect of administration of aqueous pulp extract of *Raphia hookeri* (APERH) on Eosinophil and Monocyte levels in female Wistar rats
9
8
7
6
5
4
3
2
1
0
a, b
b
a
a, b
4
5
1.33
4
4
7
2
2
Eosinophil (%)
Monocyte (%)
Group 1
Group 2
Group 3
Group 4
Study Groups


Effect of administration of aqueous pulp extract of Raphia hookeri fruit (APERHF) on mean corpuscular volume (MCV) in female Wistar rats
200
180
160
140
120
100
80
60
40
20
0
a
a, b
a, b, c
72
110.33
159
125
Group 1
Group 2
Group 3
Group 4
Study Groups


Effect of administration of aqueous pulp extract of Raphia hookeri fruit (APERHF) on mean corpuscular haemoglobin concentration (MCHC) in female Wistar rats
500
450
400
350
300
250
200
150
100
50
0
a
a, b
a, b, c
412
272
191
233
Group 1
Group 2
Group 3
Group 4
Study groups





DISCUSSION

The findings of this study offer valuable insights into the haematological effects of the aqueous pulp extract of *Raphia hookeri* fruit (APERHF) on erythrocyte indices and platelet counts in female Wistar rats. The analysis showed dose-dependent responses in the blood parameters, revealing notable changes across various doses. Specifically, APERHF treatment at higher concentrations resulted in a significant reduction in erythrocyte count and mean corpuscular haemoglobin concentration, while increasing mean corpuscular volume and reducing platelet count. These effects suggest potential implications for blood health and highlight the importance of understanding how natural compounds like APERHF interact with erythrocytes and platelets at varying dosages. The observed reduction in erythrocyte count, particularly in the 2000 mg/kg and 3000 mg/kg treatment groups, suggests a suppressive effect of high-dose APERHF on erythropoiesis or on erythrocyte survival. This outcome is consistent with previous research on high doses of antioxidants, which have been shown to impact erythrocyte membrane integrity and lead to premature breakdown of red blood cells under certain conditions (Sies *et al.*, 2017). Additionally, the increase in MCV, particularly at higher APERHF doses, implies a potential macrocytic effect, whereby erythrocytes become larger but are fewer in number. Macrocytosis, often linked to oxidative stress, can be associated with elevated levels of certain

vitamins or antioxidants (Hoffbrand *et al.*, 2011). Components within APERHF, such as vitamins E and C, are known to combat oxidative stress; however, their excessive presence may disrupt erythrocyte metabolism and contribute to changes in cell size, likely through alterations in cell maturation and membrane stability (Hebbel *et al.*, 1982). All the evaluated values including total white blood cell count, the significant increase observed in group three (moderate treatment of RHFPAE) .Meanwhile those treated with high dose highlighted significant decrease as shown in figure and white blood cell differential count which include; neutrophil, lymphocyte, monocytes, eosinophil and basophil. Neutrophils indicated geometric dose-dependent increases in the test groups when compared to control group. Meanwhile lymphocytes level in test groups revealed significant reductions when respectively compared to that of control. The decreases were in uniform fashion with increasing doses. There was significant decrease in low dose and medium dose treated groups of eosinophils while there was no significant variation in other test groups. On the changes in monocyte levels there was only a significant increase in medium dose treated group and a significantly reduced monocyte in high dose treated group. The study investigated the effect of raffia palm mesocarp on the haematological properties of African catfish. Results showed that increasing concentration of raffia led to increase in white blood cells, eosinophils and monocytes. Another research carried out by (Jedege et al., 2015) have reported Monocytes and Eosinophils recorded during the study to be 12.0% and 1.40 x 10 3/µL respectively in the control and increased significantly ($P<0.05$) as the concentration of raffia palm mesocarp increases. The analysis revealed dose-dependent responses in leukocyte parameters, revealing notable changes across various doses. Apparently, treatment with RHFPAE at higher dose indicated a significant reduction in Total white blood cell count, a higher neutrophils, a reduced lymphocytes, showed no variation in eosinophil levels but showed a significantly reduced monocytes. These Changes suggest potential implications for immune health and highlight the importance of understanding how natural compounds like the extract interact with Leukocytic parameters and percentage change in body weight at varying dosages. The observed reduction in platelet count across the treatment groups, particularly in the 3000 mg/kg dose, suggests that APERHF may impact platelet production or reduce platelet lifespan. Platelets play an essential role in clot formation, and a lower platelet count can compromise haemostasis, potentially leading to an increased risk of bleeding (Harrison & Keeling, 2005). While antioxidants such as vitamins C and E are known to stabilize platelet function by reducing oxidative damage, an excess intake can disrupt the balance and impair thrombopoiesis (Tao *et al.*, 2019). Excessive antioxidants, which reduce ROS levels excessively, may alter the oxidative environment necessary for maintaining platelet production and stability (Oluwaniyi *et al.*, 2014). A notable reduction in MCHC was observed with increasing APERHF doses, especially in the medium- and high-dose groups. Lower MCHC levels suggest a possible decrease in haemoglobin concentration per erythrocyte, potentially impacting the cells' oxygen transport capacity. This effect could be linked to interactions between APERHF's antioxidant-rich profile and erythrocyte functionality. High antioxidant levels, while protective at moderate doses, might interfere with the reactive oxygen species (ROS) balance and affect cellular haemoglobin retention, as reported in studies on antioxidant impacts on red blood cells (Roberts & Fulwood, 2018). Similar findings have been documented in studies where antioxidant-rich compounds affected cellular iron metabolism, influencing haemoglobin synthesis and storage within erythrocytes (Ganz, 2019). The percentage change in body weights of the study models increases in those of groups 2 and 3 (treated with low and medium doses respectively) when compared to that of the control group; but none of these increases were statistically significant ($p>0.05$). On the other hand, the mean percentage change in body weights of group 4 rats indicated reductions when compared to all other groups including that of the control group; but this reduction was only statistically significant ($p<0.05$) with respect to those of groups 2 and 3.

CONCLUSION

In conclusion, APERHF may offer antioxidant benefits at lower doses; however, high-dose administration could adversely impact haematological health by altering erythrocyte and platelet parameters. These findings emphasize the importance of dose regulation to maximize the therapeutic potential of APERHF while minimizing risks associated with excessive antioxidant intake. This study provides evidence that aqueous extract

of *Raphia hookeri* fruit significantly affects erythrocyte indices and platelet counts in female Wistar rats, particularly at high doses. Notably, high-dose APERHF administration reduced erythrocyte count, MCHC, and platelet count, while increasing MCV. The outcome of this investigation has been able to reveal that aqueous extract of Raphia Hookeri fruit pulp (mesocarp) when consumed in High rates reduces total white blood cell count significantly when compared to taking it at a low to moderate rate of consumption. And also when the extract is consumed in moderate dose, raises mean level of total white blood cell. The impact of raphia hookeri fruit pulp extract shows the effect of traditional medicine in the fight against Leukocytopenia and leukocytosis because leukocytes is a huge factor of immunity. *Raphia hooker*i fruit does not have significant effect on body weight percentage. The haematological effects observed in this study may be attributed to the high lipid and antioxidant content in the extract including vitamins C and E, flavonoids, and phenolic compounds. While these constituents provide significant health benefits, they may also impact blood parameters, particularly when consumed in high quantities. For instance, the lipid content in *Raphia hookeri* could potentially influence cell membrane composition, contributing to changes in membrane stability, as well as the risk of dyslipidaemia if consumed excessively (Pappan & Rehman, 2021). Such dyslipidaemia could lead to oxidative stress in erythrocytes, affecting their survival and morphology. Furthermore, although antioxidants like vitamins C and E are effective in neutralizing ROS, high levels may create an overly reduced cellular environment, impacting cellular processes essential for erythropoiesis and thrombopoiesis (Greco, 2005). Greco, 2005 research illustrated that while moderate doses of vitamins C and E strengthen cellular resilience, high doses can disrupt cellular balance, particularly in blood cells that undergo high oxidative turnover. These results indicate that, although the extract contains beneficial antioxidants, its overuse could have detrimental effects on haematological parameters, specifically erythrocytes and platelets. This study underlines the dual nature of natural antioxidants in promoting health, reinforcing the need for controlled doses to ensure their safe use.

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