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EVALUATION OF BLOOD AND SEMEN QUALITY PROFILES FOLLOWING JUSTICIA CARNEA LEAF EXTRACT ADMINISTRATION IN A RAT MODEL OF BENIGN PROSTATIC HYPERPLASIA

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Abstract
Background. *Justicia carnea is a medicinal plant used widely in Nigeria which is reported to have diverse functions, including anticancer, antioxidant, anti-inflammatory and haematinic potentials.*
Aim. *The impact of aqueous extract of Justicea carnea (JC) leaf in testosterone propionateinduced benign prostatic hyperplasia in male wistar rat on haematological and semen profile parameters was investigated.*
Methods. *The experimental animals were randomly grouped into five groups of six rats each – group 1 (normal control), group 2 (induced control), group 3 low dose (500 mg/kg of JC extract), group 4 high dose (1500 mg/kg of JC extract) and group 5 (standard control). Testosterone propionate was administered once at a dose of 7mg/kg b.w. for 11days to induce benign prostatic hyperplasia. After 28 days of extract administration, they were sacrificed and blood and semen were collected and used for biochemical analysis.*
Results. *Packed Cell Volume (PCV) values, Red Blood cell (RBC) and haemoglobin (Hb) concentrations increased ($p < 0.05$) significantly after 28days of administering aqueous extracts of Justicia carnea. There were significant ($p < 0.05$) decreases in semen motility, sluggishness, activeness and total sperm count. The groups treated with aqueous extract of Justicia carnea showed does dependent significant ($p < 0.05$) increase relative to group 5 which was treated with reference drug (finasteride).*
Conclusion. *Aqueous extracts of Justicia carnea not only improved haematological indices conditions in the testosterone propionate-induced rats, it also ameliorated the semen profile, and this may be attributed to its rich phytochemical, nutrient and vitamin composition. Therefore, the findings of the study suggest that J. carnea leaves could be used to manage sperm abnormalities and anaemia associated with benign prostitis.*

Keywords: *Justicia carnea, Aqueous, Semen quality, Haematological parameter, Wistar rat.*

Introduction

Benign prostatic hyperplasia (BPH) is characterized by non-malignant enlargement of the prostate. BPH involves increases in the number of both stromal and epithelial cells in the transitional zone of the prostate and can cause lower urinary tract symptoms, which includes urgency, frequency, dysuria, incontinence and suprapubic pain, (Asiwe et al., 2023).
There is no known anti-BPH drug that can completely cure BPH without serious adverse effect. Therefore efforts to develop new drugs have been on the increase. In order to test new antiBPH drugs, BPH animal

models are necessary for in vivo efficacy studies. The concept that androgens are important for the maintenance of prostate disease dictates the standard of care for BPH (Eruotor *et al.,* 2023)

Medicinal plants have been reported to have beneficial properties used for the management of various ailments because they have been discovered to contain bioactive compounds called phytochemicals (Onyegeme-okerenta *et al.,* 2021) and secondary metabolites that can protect humans against diseases (Asiwe et al., 2023). The availability of synthetic drugs used in the treatment of a specific disease is common but characterized with high cost and registered side effects associated with their use thereby prompting the attention currently given to the use of medicinal plant products as a viable alternative therapy in the prevention or management of various ailments.

The genus *Justicia*, named after the 18th-century Scottish botanist James Justice, belongs to the large family of Acanthaceae consisting of about 600 species of herbs and shrubs native to the tropics and subtropics (Corrêa and Alcântara, 2012; Onyege-Okerenta *et al.,* 2023). *J. carnea* (*Justicia carnea*) is a flowering plant, widely distributed in various parts of Africa. In Nigeria, the shrubs of *J. carnea* are grown around homesteads and act as fences, which are easy to grow and propagate from stem cuttings by pushing the stems 1 to 2 inches into the soil. A survey among the Igbo local populace in Nigeria revealed that the plant under study is locally called "ogwu obara" meaning blood tonic. The deep purple colored juice from the leaves of this plant is extracted either by soaking or boiling in water, which can be drunk as tea. In other localities in Nigeria, the raw leaves are chewed and used together with "nchu anwu" as culinary vegetables to garnish yam porridge.

Traditionally, several species of *Justicia* are used in the management of inflammation, gastrointestinal disorders, respiratory tract infection, fever, pain, diabetes, diarrhoea, liver diseases, rheumatism and arthritis (Onyegeme-Okerenta *et al.,* 2021). They also possess antiinflammatory, anti-allergic, anti-tumoral, anti-viral and analgesic activities (Asiwe *et al.,* 2023). Species of Justicia found in India, such as *Justicia traquebareinsis* and *Justicia wynaadensis,* have been reported to possess cardioprotective properties (Akpovwehwee, *et al.,* 2021) and antioxidant activity, respectively (Medapa et al., 2011).

2. MATERIALS AND METHODS

2.1 Plant materials

Fresh leaves of *Justicia carnea* were collected from their natural habitat at Rumuogba, Obio/Akpor L. G. A. Rivers State. The plant materials were identified and authenticated by a plant taxonomist at the Department of Plant Science, University of Port Harcourt, Nigeria, Dr Ekeke Chimezie and given the Voucher number UPH/V/1448.

The leaves were removed from the stems, sorted, washed and pulverized to powder using an electric blender after air drying. The powdered leaves were stored in airtight containers until use. Extraction was performed by dissolving 1 kg of a powdered sample of its leaves in 5 L of water and allowed to stand for 48 hours with constant stirring. At the end of the extraction, the solution was filtered using Whatman No.

1 filter paper, and the extract was concentrated to a semi-solid residue in a water bath at 60°C for 2 days. A total amount of 24.6 g of the extract was obtained.

2.2 Phytochemical analysis

Some of the phytochemicals investigated in the leaves include Spartein, Epihedrine, Narigenin, Phytate, Kaempferol, Dihydrocystisine, Sapogenin, Flavone, Anthocyanin, Tannin, Ribalinidine (Asiwe et al., 2023).

2.3 Experimental Design

A total of 30 male wistar rats weighing 200–210g were used for this study. All the experimental animals used were purchased from the Department of Pharmacology animal farm, University of Port Harcourt, Nigeria. The animals were housed in standard polypropylene cages and were acclimatized for fourteen days at the pharmacology animal, University of Port Harcourt, Nigeria. The animals were allowed free access to food and water *ad libitum.* After acclimatization, they were randomly grouped into five groups of six animals as follows:

- group 1: normal control (received food and water only)
- group 2: Induced control (received Testosterone propionate but not treated)
- group 3: Induced + extract low dose (500 mg/kg body weight) • group 4: Induced + extract high dose (1500 mg/kg body weight)
- group 5: Induced + Finasteride (standard drug control).

2.4 Haematological analysis

The haematological parameters were estimated using the automated haemanalyzer.

Animals in groups 2, 3, 4 & 5 received a single dose of 7mg/kg body weight via subcutaneous route (s.c) for 11days to establish benign prostatic hyperplasia (BPH) following the methos of Eruotor et al., 2023. The animals in group 1 were given food and water only *ad libidum* for the entire duration. Different doses of aqueous extract of *Justicia carnea* were administered to the animals across the groups. Group 3 received low dose of 500mg/kg aqueous exract of *JC* while group 4 received 1500mg/kg respectively for 28days. Animals in group 5 received 5mg/kg of the reference drug (finasteride) for the duration as those in groups 3 and 4 while animals in group 2 were induced with testosterone propionate but not treated. Extracts of this plant were administered orally to the animals with the aid of oral cannulas for 28 days. The animals were sacrificed after 28 days, and blood was collected in EDTA tubes for haematological studies.

2.5 Relative organ weight determination

The percentage change in the body weight of the experimental animals was calculated as:

{Final body weight-initial body weight} / {final body weight} × 100

Similarly, after sacrificing the animals, the kidney, liver, heart and spleen were promptly excised and weighed using a top loading balance and their relative organ weight calculated thus:

Relative organ weight = organ weight [g] / body weight [g]

2.6 Semen Analysis

Assessment of semen parameters, which include, the percentage of motile cells, dead cells, and morphological appearance of the sperm cells of the spermatozoa and total sperm count were determined by adopting method of Eruotor *et al.,*2024. Semen fluid was extracted from the rat's epididymis onto a clean microscope slide, followed by the addition of few drops of normal saline. This preparation was used to evaluate sperm quality, including total sperm count, motility, and morphology.

The total sperm cells were counted in the five larger squares of the counting chamber using a high magnification of the objective lens of the microscope. The motility assessment after sample preparation, the active sperm cells and dead cells were recorded accordingly.

2.7 Statistical analysis

The results were expressed as mean ±SD. Data were analysed using one-way analysis of variance (ANOVA) using SPSS version 20.0. Differences between means were considered to be significant at ($p < 0.05$) using the post hoc test (Least Square Difference).

3. Results and Discussion

3.1 Phytochemical parameters

The analysis of aqueous leaf extract of *Justicia carnea* revealed the presence of a cassette of phytochemicals that possess pharmacological benefits as shown in Table 1. The extract is rich in bioactive alkaloids and flavonoid which include Spartein (8.02µg/ml), Epihedrine (6.24 µg/ml), Narigenin (6.0µg/ml), Phytate (5.62 µg/ml), Kaempferol (5.22µg/ml), Dihydrocytisine (4.32µg/ml), Sapogenin (4.10µg/ml), Flavone (3.90 µg/ml), Anthocyanin (3.42µg/ml), Tannin (2.02 µg/ml) and Ribalinidine (3.25 µg/ml). Spartein, Epihedrine, Narigenin, Phytate, Kaempferol and Dihydrocytisine were observed as the most abundant secondary metabolites of *J. carnea* leaf aqueous extract. Kaempferol and anthocyanin have reportedly shown positive results from investigation as antioxidant, anti-inflammatory, antimicrobial, and cardiovascular agents (Yeon *et al.,* 2019; Yang *et al.,* 2021; Asiwe *et al*., 2023; Xue *et al.,* 2023). Sparteine which is identified as a quinolizidine alkaloid abundant in Lupinus, sparteine has been implicated in reducing locomotor activity and exert analgesic effects in the central nervous system (Villalpando-Vargas & Medina-Ceja, 2016). It also showed anticonvulsant properties in experimental animals; delaying the onset of convulsive behavior and decreasing the severity and mortality of rats treated with pilocarpine (Villalpando-Vargas & Medina-Ceja, 2016). The hypoglycaemic effect of spartein has been reported; sparteine sulphate enhances β-cell secretion, causing a fall in plasma glucose concentration (Ogunka-Nnoka *et al.,* 2018). In another study, Sparteine exerts anticancer effect on human cervical cancer cells via induction of apoptosis, inhibiting the phosphorylation of VGFR2 in a concentration-dependent manner (Tian *et al.,* 2019, Liang and Liu, 2019). Naringenin is a natural flavonoid with significant neuroprotective properties; anti-neuroinflammation, anti-neuroapoptosis and antioxidant properties have been reported

(Nouri *et al.,* 2019; Kamoru *et al.,* 2023 & Asiwe *et al*., 2023). Additionally, it exerts control on body lipids through hypocholesterolemic and hypolipidemic and regulates blood pressure with antagonistic activities against inflammation (Nouri *et al.,* 2019; Kamoru *et al.,* 2023). Phytates are salts of phytic acid, they are storage form of phosphorus in all grains, certain fruits and vegetables (Asiwe *et al*., 2023). They have been shown to exhibit anti-inflammatory, metal chelating and antioxidant activities (Urbano *et al.,* 2000; Gibson *et al.,* 2010). Epihedrine is linked with antibacterial and antifungal activities (Tulgar *et al.,* 2018). Other studies have confirmed that Kaempferol possesses antioxidant, antiinflammatory, antimicrobial, cardiovascular, and neuroprotective properties (Zhu *et al.,* 2018, Yeon *et al.,* 2019; Bangar *et al.,* 2022). Also, physiological properties of the polyphenolic compound tannin, includes antibacterial, anti-inflammatory, antioxidant, antivirus, antidiarrheal and anti-malarial activities (Buzzini *et al.,* 2008; Koleckar *et al.,* 2008).

Table 1. Quantitative phytochemical composition of aqueous leaf extract of *Justicia carnea*.

Phytochemical	Composition (μg/ml)
Spartein	8.02
Epihedrine	6.24
Narigenin	6.00
Phytate	5.62
Kaempferol	5.22
Dihydrocystisine	4.32
Sapogenin	4.10
Flavone	3.90
Anthocyanin	3.42
Tannin	2.02
Ribalinidine	3.25

3.2 Effect Testosterone Propionate on Organ weight of Wistar rats.

There was no significant ($p < 0.05$) difference in the relative heart, liver and kidney weight for all groups relative to the non-induced and induced controls. This indicates that the leaves of *J. carnea* were not toxic for the organs at the doses administered. The relative spleen weight was significantly ($p < 0.05$) greater in the induced control (group 2) when compared to the noninduced control (group 1) and treated groups. This effect could be the consequence of the metabolism of Testosterone propionate. The spleen serves to cleanse the body of damaged old particles transported by the blood (Jakubovský et al., 1990). This suggests that an increase in the relative spleen weight might be attributed to the spleen fighting foreign particles due to the BPH condition of the rats in group 2. This is also consistent with previous reports which suggest that the rate of erythropoiesis and 2’5’-A polymerase activity increases especially in antimalarial studies after a dose of phenylhydrazine to induce malaria (Onyeabo *et al.,* 2017).

Table 2. Relative organ weight of Testosterone-induced BPH in rats administered with aqueous extracts of *Justicia carnea* leaves.

Groups	Heart (g)	Liver (g)	Kidney (g)	Spleen (g)
1	$4.7\times10^{-2a} \pm5.0\times10^{-3}$	$4.8\times10^{-2a} \pm3.0\times10^{-3}$	$6.6\times10^{-2a} \pm3.4\times10^{-3}$	$4.6\times10^{-2a} \pm6.0\times10^{-3}$
2	$4.5\times10^{-2a} \pm4.0\times10^{-3}$	$4.5\times10^{-2a} \pm3.0\times10^{-3}$	$8.2\times10^{-2a} \pm1.4\times10^{-3}$	$6.8\times10^{-2b} \pm7.0\times10^{-3}$
3	$4.6\times10^{-2a} \pm8.0\times10^{-3}$	$4.9\times10^{-2a} \pm5.8\times10^{-3}$	$9.1\times10^{-2a} \pm1.7\times10^{-3}$	$5.9\times10^{-2a} \pm1.0\times10^{-3}$
4	$4.4\times10^{-2a} \pm5.0\times10^{-3}$	$4.9\times10^{-2a} \pm1.2\times10^{-3}$	$9.3\times10^{-2a} \pm1.3\times10^{-3}$	$4.3\times10^{-2a} \pm5.0\times10^{-3}$
5	$4.3\times10^{-2a} \pm5.0\times10^{-3}$	$4.8\times10^{-2a} \pm1.4\times10^{-3}$	$9.7\times10^{-2a} \pm1.2\times10^{-3}$	$4.6\times10^{-2a} \pm7.0\times10^{-3}$

Values are means ±SD. Means with different superscript letters in the columns are significantly different ($p < 0.05$). Groups: 1 – normal control, 2 – induced control, 3 – induced + treated low dose (500 mg/kg), 4 – induced + treated high dose (1500 mg/kg), 5 – induced + treated with Finasteride (5mg/kg). 3.3. Effect of Testosterone Propionate on semen quality parameters

Individual results of seminal fluid analyzed is given in Table 3. The analysis of semen quality parameters showed that rats induced with testosterone propionate (TP) showed a significant ($p < 0.05$) decrease in sperm activeness (act), viability(viab) and total sperm volume (TSV) for the experimental groups when compared to the normal control group 1.

3.3.1 Semen motility and active cells

The experimental groups treated with testosterone propionate (TP) exhibited a significant ($p < 0.05$) decline in sperm volume and active cells (activeness) compared to the normal control (Group 1). In Group 1, sperm volume was 0.20±0.017 while in Group 2(induced with TP), it dropped drastically to 0.07±0.02. Similarly, the percentage of active sperm cells decreased from 71.67±4.41 (control) to 60.67±3.33 (Group 2). Impaired sperm volume and motility is a recognized consequence of prolonged exogenous testosterone administration. This hormonal intervention can negatively impact the prostate gland, a key organ responsible for producing seminal fluid. Consequently, the provision of essential nutrients and the maintenance of an optimal pH environment for spermatozoa are compromised. The observed enlargement of the prostate following testosterone propionate treatment further suggests a disruption of its normal physiological function, ultimately contributing to poor sperm motility. This finding aligns with the observations of Yassin et al. (2025), who reported that exogenous testosterone suppresses spermatogenesis by reducing follicle-stimulating hormone (FSH) and luteinizing hormone (LH) levels, thereby leading to impaired sperm motility. Similarly, Silveira et al. (2023) have documented the detrimental effects of long-term testosterone administration on sperm function. Furthermore, the epididymis plays a crucial role in the acquisition of sperm competence, facilitating maturation, transport, and storage. Spermatozoa produced in the testes are initially immature and lack the capacity for effective fertilization. Their transit through the epididymis, an anatomically coiled structure connecting the seminiferous tubules to the vas deferens, is essential for undergoing critical maturational changes.

3.3.2 Sluggish and dead cells

A marked increase in sluggish and dead sperm cells was observed across the TP-induced groups. In Group 1, dead sperm cells were 16.67±3.33%, whereas in Group 2, the percentage rose to 21.67±4.41%. The increase in sluggish sperm suggests a deteriorating sperm quality, which has been previously linked to testosterone therapy-induced gonadal suppression (Di Guardo *et al.,* 2020). Due to excessive administration of testosterone propionate generates a high activity of oxidative stress which affects the mitochondria of the cells resulting from the release of reactive oxygen species causes slowing celleluar activities and apotosis of the spermatozoa (McLachlan et al., 2002). Prolonged administration of TP triggers inflammatory cytokine leading to cellular damage and cellular fatigue (spermatozoa)

3.3.3 Total Normal sperm count and viability

The total normal sperm count (NSC) and sperm viability followed a decreasing trend. The control group had a NSC of $78.33±3.33×10^6$ cells/mL, but in Group 2, it plummeted to $50.00±2.88×10^6$ cells/mL. Viability also reduced from 78.33±4.41% (control) to 63.00±2.89% (Group 2). The results obtained from this study shows that testosterone propionate exhibit the negative effects upon the cytosolic cells and the leydig cells, which are responsible for the production or synthesis of spermatozoa due to its direct effect on the hypothalamic-gonadalaxis, that negatively affect the anterior pituitary gland for the release of LH and FSH.

Table 3: Effect of Testosterone Propionate on semen quality parameters

s/n	GROUP	VOL	PH	VIABILITY	NORMAL	ABNORMAL	ACTIVE	SLUGGISH	DEAD

1	POSITIVE CONTROL	$0.20\pm0.017_{a}$	$8.00\pm0.00_{a}$	$78.33\pm4.41_{a}$	$78.33\pm3.33_{a}$	21.67 ± 3.33^{a}	$71.67\pm4.41_{a}$	$11.67\pm1.67_{a}$	$16.67\pm3.33_{a}$
2	NEGATIVE CONTROL	$0.07\pm0.02_{b}$	$8.00\pm0.00_{a}$	$63.00\pm2.89_{a}$	$50.00\pm2.88_{b}$	30.00 ± 2.89^{b}	$60.67\pm3.33_{a}$	$11.67\pm1.67_{a}$	$21.67\pm4.41_{a}$
3	GROUP 3	$0.10\pm0.06_{a}$	$8.00\pm0.00_{a}$	$60.00\pm2.89_{b}$	$61.67\pm4.41_{a}$	18.33 ± 4.41^{a}	$62.33\pm3.33_{b}$	8.33 ± 3.33^{b}	$13.33\pm3.33_{b}$
4	GROUP 4	$0.18\pm0.02_{b}$	$8.00\pm0.00_{a}$	$68.33\pm1.67_{c}$	$78.33\pm1.64_{b}$	20.67 ± 1.67^{b}	$69.00\pm2.89_{c}$	$11.67\pm1.67_{a}$	$16.33\pm3.33_{c}$
5	GROUP 5	$0.21\pm0.01_{c}$	$8.00\pm0.00_{a}$	$85.00\pm2.89_{c}$	$79.67\pm1.67_{c}$	33.33 ± 1.67^{c}	$68.33\pm1.67_{d}$	$10.00\pm0.00_{a}$	$18.67\pm1.67_{d}$

Individual results of seminal fluid analyzed is given in Table 3. The analysis of semen quality parameters showed that rats induced with testosterone propionate (TP) showed a significant ($p < 0.05$) decrease in sperm activeness (act), viability (viab) and total sperm volume (TSV) for the experimental group (group 2) when compared to the normal control group 1. Groups 3 and 4 that received low and high doses of ALEJC showed significant increase when compared to groups 1 (normal control) and 5 (treated with 5mg/kg of finasteride).

3.4 Effects of aqueous extracts of *Justicia carnea* leaves on some haematological indices of wistar rat.

Packed Cell Volume (PCV)

The results obtained for the impact made by the various extracts on some haematological indices are shown in Table 4. Different concentrations of the respective extracts exhibited different impact on PCV. The table showed a significant elevation ($p<0.05$) for sets that were administered various plant extracts (3 -4) when compared to the negative control. Relative to group 1, the PCV gradation of group 2 was remarkably ($p<0.05$) lowered. The PCV levels for groups given plant extracts were similar ($p>0.05$) to the value obtained from the normal control (group1).

Red Blood Cell (RBC)

Table 4 also indicates an RBC value for the normal control of 7.39±0.54. The RBC for the negative control group (induced without treatment) was 5.47±0.22. Comparing the RBC of the treated groups to the negative control showed an increase which was statistically significant ($p<0.05$). The RBC of the positive control was similar to the RBC of the treated groups.

Haemoglobin Concentration

In this study, the haemoglobin concentration for the normal control was 14.34±0.38 and the value for the induced group (without treatment) was 12.48±0.51. Comparing the haemoglobin concentration of the treated groups to the negative control revealed an elevation that depends on the graded doses ($p<0.05$).

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The haemoglobin concentration of the positive control was significantly ($p<0.05$) increased relative to the negative control, according to doses and plant extracts. The haemoglobin concentration for the treated groups were similar ($p<0.05$) to the haemoglobin concentration of the positive control.

White Blood Cell Count

The results of total white blood cell count showed the WBC count for the normal control (group 2) as 7.96±1.06 and for group 2 as 6.22±0.91. Relative to group 2, WBC count for the treated groups were increased; this had a remarkable value ($p<0.05$). Comparing the WBC count of the normal control to groups 3 and 4 that received extracts of the plants, showed a significant variance ($p<0.05$).

After 28 days of treatment, there was a significant ($p < 0.05$) increase in the PCV count in groups 3 and 4 relative to group 1The results from table 4 shows a significant ($p < 0.05$) increase in PCV count was also recorded in all groups relative to the group 2. This indicates that extracts of *J. carnea* increased RBC count and PCV and therefore could be said to have blood boosting potentials after 28 days. According to Berger (Onyeabo *et al.,* 2017), animals were considered blood deficiency when decreases in Hb level, RBC count, PCV and impaired erythrocyte deformability were observed in animals. The increase in PCV could be a result of the body's response to low PCV level resulting in the production of blood cells in order not to deprive the animal of oxygen in circulation.

Table 4. Effect of aqueous extracts of *J.carnea* blood profile of Testosterone-induced Wistar rat.

GROUP	PCV	HGB	WBC	PLT	NEU	LYMP	MON	EOS	RBC
GRP 1	41.50±2.50^{a}	14.34±0.38^{b}	10.30±0.38^{a}	292.60±56.93^{a}	43.00±2.00^{b}	51.32±1.00^{a}	4.50±0.92^{a}	1.50±0.70^{a}	7.39±0.54^{a}
GRP 2	39.02±2.50^{b}	12.48±0.51^{c}	12.40±0.51^{b}	238.80±53.94^{a}	24.00±0.90^{a}	71.39±1.00^{b}	3.50±0.40^{a}	1.50±0.70^{a}	5.47±0.22^{b}
GRP 3	42.00±2.00^{a}	16.24±0.93^{a}	5.50±0.30^{b}	392.60±34.68^{b}	26.50±1.36^{b}	66.00±0.59^{c}	6.50±0.61^{a}	1.00±0.00^{b}	7.43±0.37^{a}
GRP 4	41.00±1.00^{a}	13.54±0.64^{b}	11.10±0.64^{c}	519.60±42.29^{c}	35.00±2.04^{b}	62.50.±1.40^{c}	2.00±1.69^{b}	0.50±0.70^{c}	6.34±0.52^{a}
GRP 5	45.00±5.00^{b}	13.02±0.71^{b}	11.02±0.71^{c}	456.80±58.08^{c}	26.50±1.35^{b}	67.00±0.67^{c}	4.00±1.13^{b}	0.50±0.50^{c}	5.72±0.34^{b}

Data are expressed as mean± standard error mean (SEM) of n=5. Values in the same column having the same alphabet superscript are termed not to be statistically significant with each other at $p<0.05$ significant level.

Fig. 1. Leaves of *Justicea carnea*

CONCLUSION

The presence of phytochemicals in the leaves were very reasonable, which suggests that the leaves of this plant can make valuable contributions to improved health and well-being. This study shows that *J. carnea* extracts possess haematinic potential, lending credence to the use of these plant extracts in folk medicine for the management of hemolytic anemia. The observations from this study revealed that leaves of *J. carnea* not only possess blood boosting properties as reported by reseachers, but have anti-inflammatory potential, which could be beneficial to individuals predisposed to inflammatory disorers such as BPH.

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