Savannah Veterinary Journal

Original article

Effects of *Spondias mombin* leaf extracts on testicular histology and semen characteristics of prepubertal (juvenile) Wistar rats

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ARTICLE INFO

Article history:

Received: February 09, 2021
Received in revised form: July 27, 2021
Accepted: August 09, 2021

Keywords:

Spondias Mombin,
Testicular, Semen,
Prepubertal,
Wistar Rats

ABSTRACT

Introduction: *Spondias Mombin* is an *Anacardiaceae* reported in folklore to be a useful therapeutic agent for some reproduction-related issues. This work seeks to explore, preliminarily, the fertility potentials of *Spondias Mombin* extracts on juvenile Wistar rats.
Methods: One hundred pre-pubertal male Wistar rats divided into four treatment groups were studied for testicular histology, semen evaluation and haematocrit following oral administration of 800mg/kg Body weight (BW) of ethyl acetate (A), isopropanol (B) and methanol (C) *Spondias mombin leaf* extracts and propylene glycol (D) for 35 days. Five rats were sacrificed from each group every seven days of extract administration for the afore-mentioned evaluations using standard methods.
Results: Body weights increased markedly from week 1 to week 3 in all the groups and the weight gain continued with the Isopropanol (ISP) group till week 5 (48.00±10.36g) in contrast to fluctuations observed in other groups. All extract-treated groups had peak Packed Cell Volume (PCV) at week 2 with highest (54.00±3.16) seen in methanol (METH) group. All the groups experienced transition from azoospermia at week 1 to sexual maturity by week 5 as evidenced by progressive increase in the spermatozoa parameters evaluated. At week two, the EA group was the only group with motility score (67.00±5.38%) suggestive of puberty attainment. Normal histology was observed in testes and epididymides in all groups after 5 weeks of extract administration.
Significance: Ethyl acetate leaf extract of *Spondias mombin* appeared to fast track attainment of puberty in Wistar rat at 800mg/kg BW. The plant's leaf methanol extract at the same concentration appeared to boost PCV and promote fertility in Wistar rats significantly.

Introduction

Infertility remains a major obstacle to productivity in livestock industry and various therapies, including the use of medicinal plants, have been instituted to ameliorate the different infertility presentations in livestock. These medicinal plants (including various herbs, shrubs and trees and plant parts such as root, leaf, flower, fruit and bark) contain substances useful for therapeutic purposes or as precursors for chemo-pharmaceuticals (Okigbo *et al.*, 2009). *Spondias Mombin,* a species of flowering plant in the family Anacardiaceae, is one of such. It is native to the tropical Americas, including the West Indies. Common names include hog plum, true yellow mombin, golden apple or java plum. In Nigeria, *Spondias mombin* is known by the names 'Iyeye' (Ayoka *et.al.*, 2008), Ngulungwu and Isada (Aiyeloja *et. al.*, 2006) in Yoruba, Igbo and Hausa languages respectively. According to folklore, all parts of the tree are medicinally important in traditional medicine. Its leaves are widely used for different medical and reproductive purposes in man and animals due to easy accessibility and efficacy.

The fruits decoction is used as a diuretic and febrifuge while the decoction of the bark and the leaves serve as emetic, antidiarrhea and handy in the treatment of dysentery, haemorrhoids, gonorrhoea and leucorrhea. Oxytocic and abortifacient activities of the leaves aqueous extract have been reported (Offiah and Anyanwu, 1989) and for these reasons, the leaves are given to pregnant female ruminants at term and those that deliver without the release of their placenta (Okwu and Ekeke, 2003). The antimicrobial, antibacterial, antifungal, and the antiviral properties of *Spondias mombin* have also been reported (Abo *et al.*, 1999, Rodrigues and Hasse, 2000). Research has shown that its aqueous and ethanol leaf extracts enhanced male fertility in the Wistar rat and bucks (Oloye *et al.*, 2011, Oloye *et al.*, 2017a). There is however a dearth of information on the effects of some other organic solvent-based extracts of *Spondias mombin* leaf on the reproductive characteristics of juvenile male Wistar rats. This work therefore sought to explore, preliminarily, the fertility potentials such extracts could have on juvenile Wistar rats. This preliminary study aimed at determining the effect of Ethyl acetate, Isopropanol and Methanol *Spondias mombin* leaf

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https//:doi.10.36759/svj.2021.127

extracts on haematocrit, body weight, spermiogram and testicular histology of juvenile Wistar rat after treatment with 800mg/kg of each of the *Spondias mombin* leaf extracts.

Materials and methods

Study Location

The study was carried out at the Theriogenology unit of College of Veterinary Medicine, Federal University of Agriculture, Abeokuta, Ogun State. Ogun state is located on the geographical map reference of latitude 3° 19.665'E and longitude 7° 09.775'N and at an elevation of 169 feet with an area of 16,762km. The area has a humid climate with mean annual rainfall and temperature of 1037 mm and 34.7°C respectively. The average relative humidity is 82% (Oyekunle *et al*., 2010).

Plant collection and authentication

Fresh leaves of *Spondias mombin* were collected within Abeokuta environs, air dried and pulverized into fine powder using a mechanical grinder, packaged in glass jars and stored on the shelf. The leaves were authenticated at National Centre for Genetic Resources and Biotechnology (NACGRAB) identified with herbarium number 473 on number 121 of Flora of west Tropical Africa families and numbers.

Plant extraction

Pulverized *Spondias mombin* (1.78kg) was soaked in 1.5litres of hexane for 3 hours for defatting after which the solution was filtered and the residue dried. The dried residue was subjected to fractionation process (solvent-solvent partition) using three solvents in order of their polarity. Thus, the dried residue (1.70kg) was soaked in 4 litres of ethyl acetate for 3 days (72 hours) after which the solution was filtered using a sieve. The filtrate was poured into a well labelled clean glass bottle and stored in a hood. Also, the resultant residue (1.60kg) was air-dried and weighed. This was then soaked in 4 litres of isopropanol for 3 days (72 hours) followed by sieving and air-drying. Filtrate was again poured into another well labelled clean glass bottle and placed in a hood. The residue (1.55kg) recovered after air-drying was again soaked in 4 litres of methanol for 72 hours. After 3 days of soaking in methanol, resultant solution was sieved; filtrate was stored in clean labelled glass bottle and stored in a hood. The residue was air-dried and weighed (1.20kg). The three filtrates (ethyl acetate, isopropanol and methanol) were labelled accordingly and subjected to pre-concentration with the aid of rotary evaporator. The resultant pastes were weighed and stored in a labelled glass jar.

Experimental animals

One hundred pre-pubertal male Wistar rats (body weight between 80-100g) were used for the study. The rats were housed in standard cages at the laboratory animal unit of College of Veterinary Medicine, Federal University of Agriculture Abeokuta and were fed with concentrates and provided water *ad-libitum*. Ethical permit for the experiment was obtained from College of Veterinary Medicine Research Ethics Committee (CREC), Federal University of Agriculture Abeokuta, Nigeria with reference no.: **FUNNAB/COLVET/CREC/2017/05/02**.

Experimental procedure

The experiment began with two weeks of stabilization of the rats. The rats were randomly grouped into four (4), each group containing twenty-five rats. Group A, B and C rats were treated with 800 mg/kg (Oloye *et al*, 2011) *Spondias mombin* ethyl acetate, isopropanol and methanol leaf extracts respectively. Group D rats which served as control were treated with the vehicle for extract administration which was propylene glycol. Oral cannula was used in dosing the rats once daily for thirty-five days. Five rats were sacrificed from each group every seven (7) days of extract administration for semen evaluation and haematocrit.

Packed cell volume

Blood was collected through the ocular canthus into EDTA bottle. Heparinized microhematocrit tubes were filled to two-third and sealed at one end with sealant and placed into a microhematocrit centrifuge, sealed ends out against a rubber ring and lid placed firmly over the centrifuge head and spinned at 2500rpm for 5mins. The tube was removed and read using haematocrit reader.

Spermiogram and semen collection

Semen collection: was by exteriorization of the testes and epididymis through the scrotal sac after cervical dislocation. Thereafter, the caudal epididymis was cut with razor and a drop of semen was milked out and placed on a pre-warmed clean glass slide. (Zemjanis, 1970).
Mass activity: To a drop of semen, a drop of 2.9% sodium citrate was added and cover slip was placed on it. It was viewed at ×40 objective for mass activity (Zemjanis, 1970).
Progressive motility: Upon further dilution of the semen with 2.9% sodium citrate of semen individual progressive sperm motility was evaluated under ×40 magnification (Zemjanis, 1970).
Live-dead ratio: The live-dead ratio was determined using Eosin and Nigrosin in 2.9 % sodium citrate dehydrate solution according to the method described by Wells and Awa (1970).
*Sperm concentration***:** The sperm concentration was determined by dropping the intact testis and epididymis in a small beaker to which 5mls of 1% formolsaline was added. Haemocytometer fixed with cover slip was charged. and was viewed at ×40 objective (Zemjanis, 1970).
Morphological abnormalities: These factors were determined from a total count of 100 spermatozoa in smears obtained with Eosin Nigrosin stains (Zemjanis, 1970).

Histology

The testes were fixed in Bouin solution for histological analysis and processed routinely for paraffin embedding. 5 µ sections were obtained with microtome and processed for Haematoxylin and Eosin Stalin (H/E) according to the method described by Akpantah *et al*. (2003) and sections were observed.

Statistical analysis

Descriptive statistics was used. Means (±SEM) were determined and One way ANOVA was used for separation of means. A value of $p < 0.05$ was considered significant.

Results

Weights of plant materials and extract
The pulverized *Spondias mombin* weighed 1.78g. After the extraction and concentration, ethyl acetate (EA), isopropanol (ISP) and methanol (METH) extracts weighed 43.27g, 78.00g and 88.14g respectively.

Packed Cell Volume
Packed Cell Volume (PCV) peaked for all extract-treated groups (EA, ISP and METH) at week 2 post administration. Subsequently, there was sharp decline in all the groups at weeks 3, 4 and 5 except in EA group where there was a peak again at the 4th week and another decline at the 5th week. Comparing Packed Cell Volume (PCV) mean values within groups, Ethyl acetate (EA) group had significantly ($p<0.05$) lower value at week 3 (31.00±4.85) compared with week 2 (46.60±3.44) and 4 (46.60±3.88). PCV values in this group fluctuated from week 1 to week 5. (Table1). In ISP group, PCV declined from week 2 (52.40±2.71) to week 5 (35.80±1.50). Weeks 1 (50.20±1.28) and 2 (52.40±2.71) values were slightly higher compared to week 4 (39.00±3.44) and 5 (35.80±1.50). PCV mean values increased gradually from week 1 (48.40±4.68) to 2 (54.00±3.16) and later declined from week 3(53.20±3.60) to 5 (37.00±1.43) in METH group. Comparing PCV values within weeks METH had higher significant ($p<0.05$) value (53.20±3.59) compared to control (CTL) (36.60±4.09) and EA (31.00±4.84) in week 3 while in week 2 both METH (54.00±3.16) and ISP (52.40±2.71) had significant ($p<0.05$) values compared to CTL (35.60±5.10) (Table 1).

Progressive Motility
Comparing motility mean values within groups (Table 2), it was observed that EA had the highest mean value 67.00±5.38 at week 2 which was highly significant ($p<0.05$) compared with groups ISP, METH and CTL following azoospermia (00.00±0.00) observed in week 1. There was a significant ($p<0.05$) increase in mean values from week 1 to week 4 in EA and METH groups. There was fluctuation in motility mean values in ISP group from week 2 to week 5 which was highly significant ($p<0.05$) (Table 2). Comparing motility values within each week among the treated groups (Table2), METH had the highest mean value (98.00±0.00) at week 4 which was significant ($p<0.05$) compared to ISP (76.00±8.57). At week 2, EA had the highest mean value (67.00±5.38) which was highly significant ($p<0.05$) compared to CTL (20.00±15.16) and METH (10.00±10.00) (Table 2).

Sperm Concentration
Mean values of sperm concentration within groups determined weekly revealed that EA had the highest mean value 78.00±27.81 at week 3 which was significant compared to week 1(0.00±0.00) and week 2 (3.00±1.00). In ISP group, there was an increase in mean value from azospermic week 1 (0.00±0.00) to week 5 (63.80±11.46) which was highly significant ($p<0.05$). There was fluctuation in mean values in CTL group from week 1 to week 5 but in METH group, there was an increase in mean values from week 1 to 4 which declined at week 5 (Table 3). Concentration mean values within each week among the treated groups showed that ISP has the highest mean value 63.80±11.46 at week 5 which was significant compared with CTL group 30.20±3.18 (Table 3).

Percentage liveability
The mean values of percentage liveability of the METH group increased from week 1 to week 5 which was highly significant ($p<0.05$) comparing weeks 4,5 with 1,2 and 3; likewise for EA except for a decline at week 4. Mean values increased in ISP and CTL groups from week 1 to week 3 which was highly significant ($p<0.05$).but fluctuated from week 3 to week 5 which was not significant ($p<0.05$). (Table 4).
Percentage liveability mean values within each week among the treated groups showed that at week 2, EA has the highest significant ($p<0.05$) mean value (69.20±2.78) compared with CTL (0.00±0.00), METH (0.00±0.00) and ISP (27.00±18.00), At week 5, methanol had the highest mean value which was significant when compared to ISP and METH (Table 4) groups. There was an increase in mean values from week1 to week 3 in CTL,EA and METH groups but declined from week 3 to week 4 which was significant in METH group.

Percentage Morphological Abnormality
All groups were azospermic at the first week. CTL and METH remained azospermic at week 2. METH had progressively decreasing abnormality from week 3 to week 5 and the week 5 value was significantly lower compared to week 3. EA had the highest values of morphological abnormalities each of the week under study and all were significantly ($p<0.05$) different compared to ISP in week 2 and 3, control in week 4 (Tables 5).

Body Weight
Body weights increased markedly from week 1 to week 3 in all the groups and the increase continued with the ISP group up till week 5 in contrast to the decrease observed in other groups in week 4 and a later rise in week 5. The weight gain was pronounced in METH (45.00±15.14) and in ISP (48.00±10.36)

group at week 5 and significant when ISP value is compared to CTL's (Table 6).

Histology

Histological sections of testes and epididymides revealed normal epithelial cells in all groups (Plates 1 and 2).

Table 1. Mean (±SEM) Packed cell volume values of Wistar rats after treatment with *Spondias mombin* extracts.

Week	Group A (Ethyl acetate)	Group B (Isopropanol)	Group C (Methanol)	Group D (Control)
1	40.80±1.32	50.20±1.28^{ab}	48.40±4.68	43.60±1.96
2	46.60±3.44^{a}	52.40±2.71$^{cd\alpha}$	54.00±3.16$^{a\beta}$	35.60±5.10$^{ef\alpha\beta}$
3	31.00±4.85$^{abd\beta}$	46.00±3.51	53.20±3.60$^{b\alpha\beta}$	36.60±4.09$^{c\alpha}$
4	46.60±3.88^{b}	39.00±3.44^{ac}	41.80±4.78	45.80±4.31
5	34.00±0.63	35.80±1.50^{bd}	37.00±1.43^{ab}	37.80±0.58

Mean values with same superscripts in alphabets (a,b,c,d) along columns differ significantly when comparing values of week 1 to 5 within each group and mean values with same superscripts in symbols (α, ß) along rows differ significantly when comparing values of Groups A to D within each week ($p<0.05$)

Table 2. Mean (±SEM) progressive motility of treatment and control group after *Spondias mombin* extracts administration

Week	Group A Ethyl acetate (%)	Group B Isopropanol (%)	Group C Methanol (%)	Group D Control (%)
1	00.00±0.00^{abcd}	4.00±4.00^{abc}	00.00±0.00^{abc}	00.00±0.00^{abc}
2	67.00±5.39$^{aghi\alpha\beta\Omega}$	29.00±19.13$^{def\beta}$	10.00±10.00$^{def\Omega}$	20.00±15.17$^{def\alpha}$
3	90.60±2.08^{bg}	92.80±3.34^{ad}	92.60±1.66^{ad}	89.00±3.67^{ad}
4	97.40±0.60$^{ch\alpha}$	76.00±8.57$^{be\alpha\beta}$	98.00±0.00$^{be\beta}$	88.00±2.00^{be}
5	83.00±3.00$^{di\Delta\beta}$	87.00±2.00$^{cf\alpha\Delta}$	94.00±1.00$^{cf\Omega\beta}$	80.00±0.00$^{cf\alpha\Omega}$

Mean values with same superscripts in alphabets (a,b,c,d,e,f,g,h) along columns differ significantly when comparing values of week 1 to 5 within each group and mean values with same superscripts in symbols (α, ß, Δ, Ω) along rows differ significantly when comparing values of Groups A to D within each week ($p<0.05$)

Table 3. Mean (±SEM) sperm concentration of treatment and control group after *Spondias mombin* extracts administration

Week	Group A Ethyl acetate ($\times10^9$)	Group B Isopropanol ($\times10^9$)	Group C Methanol ($\times10^9$)	Group D Control ($\times10^9$)
1	0.00±0.00^{a}	0.00±0.00^{ab}	0.00±0.00^{abc}	1.60±0.97^{a}
2	3.00±1.00$^{b\alpha\beta}$	0.60±0.40$^{cd\alpha}$	0.20±0.20d$^{def\beta}$	1.40±0.40^{b}
3	78.00±27.81^{ab}	12.40±3.91^{e}	33.00±8.87^{ad}	51.20±21.88^{ab}
4	54.80±11.90	49.80±16.90^{ac}	58.00±13.10^{be}	35.60±8.60
5	55.80±1.71$^{\alpha}$	63.80±11.46$^{bde\beta}$	43.00±3.69^{cf}	30.20±3.18$^{\alpha\beta}$

Mean values with same superscripts in alphabets (a,b,c,d,e,f) along columns differ significantly when comparing values of week 1 to 5 within each group and mean values with same superscripts in symbols (α, ß) along rows differ significantly when comparing values of Groups A to D within each week ($p<0.05$)

Table 4. Mean (±SEM) sperm percentage liveability of treatment and control groups after *Spondias mombin* extracts administration

Week	Group A Ethyl acetate (%)	Group B Isopropanol (%)	Group C Methanol (%)	Group D Control (%)
1	0.00±0.00^{abcd}	0.00±0.00^{abc}	0.00±0.00^{abc}	0.00±0.00^{abc}
2	69.20±2.78$^{aeg\alpha\beta\Delta}$	27.00±18.00$^{def\beta}$	0.00±0.00$^{def\Delta}$	0.00±0.00$^{def\alpha}$
3	82.60±3.78$^{be\alpha\Delta}$	88.4±3.69$^{ad\beta\Omega}$	99.20±0.37$^{adgh\Delta\Omega}$	99.00±0.77$^{adg\alpha\beta}$
4	93.20±2.20$^{cfg\beta}$	69.6±7.66$^{be\alpha\beta\Delta}$	100.00±0.00$^{beg\Delta}$	95.60±0.60$^{beg\alpha}$
5	74.20±4.18$^{df\alpha\Delta}$	80.4±4.15$^{cf\beta\Omega}$	100.00±0.00$^{cfh\Delta\Omega}$	98.00±0.89$^{cf\alpha\beta}$

Mean values with same superscripts in alphabets (a,b,c,d,e,f,g,h) along columns differ significantly when comparing values of week 1 to 5 within each group and mean values with same superscripts in symbols (α, ß, Δ, Ω) along rows differ significantly when comparing values of Groups A to D within each week ($p<0.05$)

Table 5. Mean (±SEM) percentage abnormal sperm morphology after treatment with *Spondias mombin* extracts

Week	Group A Ethyl acetate (%)	Group B Isopropanol (%)	Group C Methanol l(%)	Group D Control (%)
1	Azospermia	Azospermia	Azospermia	Azospermia
2	39.00±1.87$^{\alpha}$	10.00±7.75$^{a\alpha}$	Azospermia	Azospermia
3	56.20±9.70$^{\alpha}$	10.00±1.67$^{b\alpha\beta}$	40.20±9.72$^{a\beta}$	30.00±5.67^{a}
4	37.40±9.06$^{\alpha}$	31.00±6.43^{ab}	29.20±5.20	8.80±1.96$^{a\alpha}$
5	40.00±3.16$^{\alpha\beta\Delta}$	23.80±4.18$^{\beta}$	11.20±1.20$^{a\Delta}$	20.4±4.06 $^{\Delta}$

Mean values with same superscripts in alphabets (a,b) along columns differ significantly when comparing values of week 1 to 5 within each group and mean values with same superscripts in symbols (α, ß, Δ) along rows differ significantly when comparing values of Groups A to D within each week ($p<0.05$)

Table 6. Mean (±SEM) body weight gain after treatment with *Spondias mombin* extracts

Week	Group A Ethyl acetate (G)	Group B Isopropanol (G)	Group C Methanol (G)	Group D Control (G)
1 – 3	46.00±11.22	22.00±10.20	42.00±2.00	44.00 ± 4.00^{ac}
3 – 4	$27.20\pm11.07^{\alpha}$	42.00 ± 9.61^{ß}	13.00±6.10	$-8.80\pm4.45^{\alpha ßab}$
4 – 5	30.80±6.35	$48.00\pm10.36^{\alpha}$	45.00±15.14	$8.80\pm3.14^{\alpha bc}$

Mean values with same superscripts in alphabets (a,b,c) along columns differ significantly when comparing values of weeks within each group and mean values with same superscripts in symbols (α, ß) along rows differ significantly when comparing values of Groups A to D within each week ($p<0.05$)

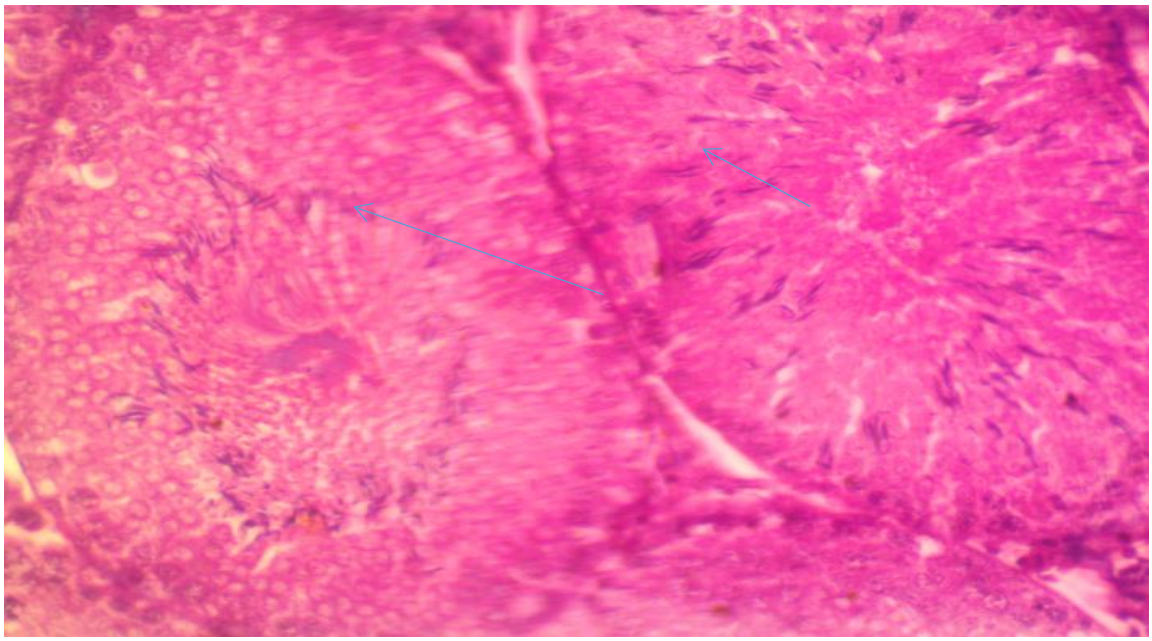

Plate 1: Photomicrograph showing the normal histology of the testis (arrowed) using Haematoxylin and Eosin (H&E) stain. (×400)

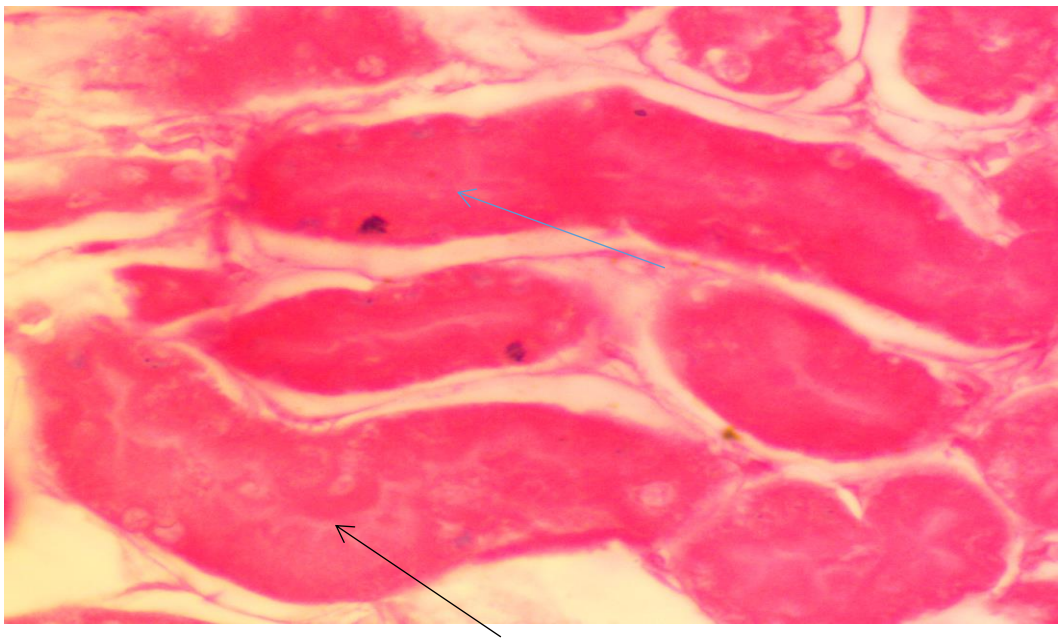

Plate 2: Photomicrograph showing the normal histology of the epididymis (arrowed) using Haematoxylin and Eosin (H&E) stain. (×100)

Discussion

Methanol (METH) and Isopropanol (ISP) extracts of SM appeared to enhance the PCV value of Wistar rats in this work going by post week 1, 2 and 3 administration values which were higher than any of the other test groups. These values fell respectively within and beyond reported normal range of 37.6-50.6% (Johnson-Delaney, 1996) and 36-54% (RAR, 2013). This is at variance with reports in the goat where Oloye *et al.* (2017b) submitted that ethanol extract of SM reduced PCV which has been claimed to be attributable to alkaloid content (Ajibade and Egbebi, 2011). The enhanced value reported in this work may be as a result of its antioxidant property (Belyagoubi-Benhammou *et al.*, 2016) that overrides the negative effects of alkaloid. There had been report of the use of SM to cure anaemia (Herbpathy, 2018). None of the plant extract had any deleterious effect on the histoarchitecture of the rats' testes and epididymides going by the histology of selected testes of all extract-treated groups and control group hence establishing the non-negative interference of the plant's leaf extract with the process of spermatogenesis.

The mean percentage motility scores of all the treatment groups at post week 1(EA and ISP) and both post week 1 and 2 (CTL and METH) extract administration indicated absence of spermatozoa (azoospermia) or presence of immotile immature spermatozoa (spermatid). These lend credence to the juvenile status of the rats. By week 2, only the EA extract group had a motility score greater than the standard recommended for fertility in some species such as 60% for human semen by World Health Organization (WHO) (Cooper *et al.*, 2010) and 30%, 60%, for the bulls and stallion respectively (Rouge, 2003). The EA group hence promoted attainment of puberty in the juvenile rats faster than other groups' capacity to do same. This might indicate EA extract of SM as a potential agent that enhances attainment of puberty. However, the METH group sustained an increased motility score better than other groups by the 3rd, 4th and 5th week of extract administration. The high motility scores observed in the METH, ISO and EA treatment groups from the 3rd week of extract administration and sustained into the 5th week is in agreement with Oloye *et al.* (2011) submission that SM enhances sperm motility scores. All these scores were greater than the control group and the 80.00±0.00% reported for normal Wistar rats by Saba *et al* (2009). All other sperm parameters (concentration, percentage abnormality and liveability) followed the same trend of progression from azoospermia status at juvenile age to sexually matured status 5 weeks into extract administration as observed with sperm motility. Also, the sperm concentration values, 5 weeks into extract administration, which was higher in EA, ISP and METH group compared to that of CTL, indicates the pro-fertility tendency of SM. However, at this same week EA seemed not to favour sperm liveability and normal morphology as much as METH and ISP indicating the fact that the EA extract could bring about reduction in fertility with chronic use, hence it might just be good enough for stimulation of puberty attainment. METH and ISP appeared to favour fertility increasingly with chronic administration as indicated in increasing sperm motility, concentration, percentage liveability and morphological normality with continual extract administration. Body weight gain was profound, expectedly, with increasing age from week 1 to week 3 in all the groups. This coincided with the transition of the rats from juveniles to adults (McCutcheon and Marinelli, 2009). Of note is the massive weight gain seen in EA group in the first 3 weeks of extract administration which was greater than others and which explains why the rats had faster puberty attainment. McCutcheon and Marinelli (2009) had opined that rat generally attain sexual maturity at attaining the weight of 115g, a weight EA group had surpassed (approximately 126g) by the third week of extract administration. The growth factors in SM may be the contributory factors to this (Taylor, 2012).

Weight loss was observed in the control from week 3 to 4 in contrast to marginal gains in the EA and METH groups and profound gain in ISP group. At the end of week 5 this gain continued, being extraordinary in ISP and METH groups, a situation which might be connected to the nutritional value embedded in the SM.as submitted by Taylor, (2012).

Conclusion

Ethyl acetate leaf extract of *Spondias mombin* appeared to fast track attainment of puberty in Wistar rat at 800mg/kg BW just as the plant's leaf Isopropanol and methanol extracts, at the same concentration, enhanced fertility and promoted weight gain hence could be good sources of aphrodisiac and growth promoter. In addition, the methanol and Isopropanol extract appeared to boost PCV when administered for just three weeks, beyond which there would be decline, hence these extracts could be good choices for treatment of anaemia.

Conflict of interest

There is no conflict of interest.

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