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Evaluation of Aphrodisiac Potentials of Premature Unripe *Carica Papaya (*Pawpaw) Fruits in Male Wistar Rats

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ABSTRACT

Sexual dysfunction in men takes different forms such as disorders of desire, disorders of orgasm, erectile dysfunction, disorders of ejaculation(persistent or recurrent ejaculation with minimum sexual stimulation that occurs before, upon or shortly after penetration and before a person wishes it or a situation where ejaculation does not occur at all) and failure of detumenscence. 20 male Wistar rats and 5 female Wistar rats were used for this study. Male animals were grouped into control (received distilled water), Viagra (5 mg/kg bw), high-dose premature plantain fruit (1500 mg/kg bw), and low-dose premature plantain fruit (500 mg/kg bw). The treatment was administered for 21 days. The animals were acclimatized for two weeks. Extracts were administered for three weeks. At the end of the treatment, Male sexual behavioural study was carried out on the study models. Numerical data derived from the present study were subjected statistical analysis using Social Sciences Software (SPSS) version 25. 24 hours after the last day of the sexual behavioural study, the animals were sacrificed and the testes were harvested for histological studies; semen was collected for semen analysis. Data were expressed as Mean ± SEM. The mean difference between the tested groups and the control was tested using a one-way ANOVA. Values were considered statistically significant when P is≤ 0.05. The results showed that premature plantain fruits were capable of rising mount frequency, intromission frequency, ejaculation frequency, and ejaculation latency in study models treated with both 1500 mg/kg and 500 mg/kg of premature plantain fruit ($p<0.05$). In conclusion, premature plantain fruits enhanced sexual desire and copulatory performance and outcomes. This plant may likely improve libido, potency and sexual pleasure.

KEYWORDS: Sexual dysfunction, Aphrodisiac substances, Male infertility,

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INTRODUCTION

Sexual dysfunction in men takes different forms such as disorders of desire (persistently or recurrent deficient sexual fantasy and desire for sexual activity), disorders of orgasm (persistent or recurrent delay in, or absence of orgasm after a normal sexual excitement phase), erectile dysfunction(persistent failure to generate sufficient penile body, pressure to achieve vaginal penetration and/or the ability to maintain this degree of penile rigidity until ejaculation), disorders of ejaculation(persistent or recurrent ejaculation with minimum sexual stimulation that occurs before, upon or shortly after penetration and before a person wishes it or a situation where ejaculation does not occur at all) and failure of detumenscence (prolonged priapism lasting for more than four hours).

Male sexual dysfunction is of varied etiologies and this includes personal lifestyles (chronic alcohol abuse, cigarette smoking), androgen deficiency, aging population, psychological disorders, side effects of some anti-hypertensives, central agents, psychiatric medications, antiulcer, antidepressants and anti-androgens and chronic medical conditions like diabetes, hypertension, and pulmonary cancer (Yakubu *et al*., 2007). Erectile dysfunction has been estimated to affect about 150 million men

worldwide- wide and its prevalence increased with age (Aytac et al.,2008). It is estimated that Nigeria has about 12 million infertile persons (Giwa-Osagie et al.,1990). Erectile dysfunction may be responsible for a reasonable amount of these. Erectile dysfunction can lead to male infertility. Male infertility is due to any problem in the male reproductive system including decreased sexual desire, barrenness, premature ejaculation etc (Kothari, 1994).

Aphrodisiac substances are used to enhance sexual performance and treat sexual dysfunction. Aphrodisiac are commonly classified into two categories: psycho-physiological stimuli preparations and internal agents mainly obtained from plants (Watcho et al., 2019). The use of plant extracts as fertility enhancers in animals and humans is now being widely accepted (Dada and Ajilore, 2009). Ginseng and yohim be are plant-based aphrodisiacs that increase sex-drive and sexual pleasure (Thody et al., 1981). The aqueous and organic extracts and compounds isolated from *Monsonia augustifolia* have been evaluated in relevant in-vitro and in-vivo biological assays for erectile dysfunction and libido (Khorombi, 2006). Rahmawati and Bachri (2012) reported that male rats treated with combined extracts of *Piper retrofractum, Centella asiatica,* and *Curcuma domestica* showed a significant increase in sexual drive. The roots of *Caesalpinia bonduc* are taken in cases of hernia and aphrodisiac (Gbankoto et al., 2015). The effect of *Phoenix dactylifera,* pollen, on sperm parameters and the reproductive system of adult male rats was studied and the results indicated that the consumption of Date Palm Pollen suspensions improved the sperm count, motility, morphology, and DNA quality with a concomitant increase in the weights of testis and epididymis (Bahmanpour et al., 2006). The aqueous extract of *Fadogia agrestis* stem increased the blood testosterone concentrations and this may be the mechanism responsible for its aphrodisiac effects and various masculine behaviors. It may be used to modify impaired sexual functions in animals, especially those arising from hypotestosteronemia (Yakubu et al., 2005). The 50% ethanolic extract of *Myristica fragrans (*nutmeg) possesses aphrodisiac activity, increasing both libido and potency, which might be attributed to its nervous stimulating property. The study thus provides a scientific rationale for the traditional use of nutmeg in the management of male sexual disorders (Tajuddin et al., 2005). Aqueous crude extract of *Montanoa tomentosa* is a potent stimulator of sexual behavior, particularly of sexual arousal in male rats, and it promotes the expression of masculine sexual behavior in previously sexually inactive animals. On these bases, this extract can be considered to possess aphrodisiac properties (Carro-Juárez et al., 2004). The stimulatory effect of *Ruta chalepensis* mediated through a pituitary testicle axis participating in the physiological events of spermatogenesis (Abdullah and Qarawi, 2005). Chauhan et al., (2013) evaluated the ethanolic extract of rhizomes of *Curculigo orchioides* for its sexual behaviour in rats. The treatment reflected a reduction of mount latency, an increase in mount frequency, and enhanced attract ability towards the female. The penile erection index was also incremented in the treated group.

Male infertility can be caused by poor penile erection, abnormal sperm quality and volume, abnormal ejaculation, among other causes. Researches into natural diets like plantain showed that its consumption by men could enhance some reproductive functions, and also alleviate certain reproductive dysfunctions. Hence, the need for further studies.

METHODOLOGY

Plant Collection

The premature plantain fruit, were obtained from Rivers State University Farm, location in Port Harcourt, Rivers State, Nigeria. A voucher sample was deposited in the herbarium located in the Department of Plant Science and Biotechnology of the Rivers State University for proper identification. The remaining samples were washed and air dried for twenty two days. The dried seeds ere pulverized into fine powder using electric blender.

Preparation of Plant Extract

The fine powders of the premature plantain fruit were soaked in 80 % ethanol solvent (ratio 40g of fine powders of the premature plantain fruit : 250 ml of ethanol). In order to achieve maximum extraction, the mixture was agitated periodically. The solution was filtered using Whatman No. I filter paper after 72 hours. The filtrate was concentrated using water bath at a temperature of 42 ^{0} C.

Study Models

Twenty male albino rats, weighing 180 ± 20g, were in good health and were acquired from Animal house unit of the Department of Human Anatomy in the Faculty of Basic Medical Sciences, Rivers State University, Nigeria. Standard cages were used and models were maintained under 12 hour's light and dark cycle. Animals had free access to feeds and water throughout the study.

Acclimatization of Animals

Prior to the experiment, the rats were acclimated for a total of 14 days (12 cycles of light and dark). Prior to the trial and throughout it, the rats had unfettered access to water. Standard rat meal was used to feed the rats.

LD50 Studies

The LD50 studies was determined using Lorke's method. This method involves two phases.

Phase 1

9 mice were used for the present study. Animals were grouped into 3 groups with each group consisting of 3 animals. Group 1 received 500mg/kg, group 2 received 1000mg/kg and group 3 received 2000mg/kg of extract. After two hours if no death is recorded, phase 2 will be carried out.

Phase 2

Nine mice were used; animals were grouped into three groups each containing three animals. Group 4 received 3000mg/kg,

group 5 received 4000mg/kg and group 6 received 5000mg/kg of extract. The animals were observed for 24 hours.

Animal Grouping/Administration

Group 1 - Animals received distilled water (0.5 mls)
Group 2 – Viagra (5 mg/kg bw) at an hour prior to the start of the experiment.
Group 3 - Low dose premature plantain (500 mg/kg bw)
Group 4 - High dose premature plantain (1500 mg/kg bw)

Duration of Studies

Animals were treated with plant extracts for three (3) weeks before studies on sexual behavior.

Procedures for Sexual Behavior Test

Female Wistar rats were brought to heat (oestrus phase) artificially using the method described by Krukru et al., (2025). Female rats allow mating only during the oestrus phase. 500mg/kg body weight of estradiol valerate suspension was administered orally to the female Wistar rats 48 hours prior to the pairing and 5mg/kg body weight of progesterone were injected subcutaneously 6 hours before the commencement of the experiment.

Sexual behavioral test was carried out 2-3 hours daily for three days before the end of the experiment. This test was carried out in the dark under dim red light because Wistar rats are most active at night.

The receptivity of the female Wistar rats was confirmed by exposing the rats to the male rats before the commencement of the experiment. Only 10 most receptive female rats will be used. The receptive females firmly raise their hind limb quarters and tails to accept male sexual advances.

The male Wistar rats were introduced into different cages and allowed to acclimatize for 10 minutes. One receptive female Wistar rat was introduced gently into the same cage (1 male: 1 female). Females that failed to accept males were substituted with another artificially warmed female. The test was terminated if the male doesn't show sexual interest. The observation of male sexual behavior commences immediately after the female is introduced into the cage containing the male. Male sexual behaviors were recorded on a digital camera. The frequencies were observed carefully and recorded manually with the aid of a stopwatch.

The following parameters of sexual behaviors were observed and recorded s described by Victor et al., 2023) :

1. **Mount frequency (MF):** This is defined as the number of times the male rat attempts to lift up its forelimbs and body over the hind quarter of the female rat with the intention of mating the female. It is known as the number of mounts before ejaculation.
2. **Intromission frequency (IF):** The number of times the male rat attempts vaginal penetration/Intromission before ejaculation.
3. **Ejaculation frequency (EF**): The number of times of ejaculation (characterized by rhythmic contraction of the posterior abdomen)
4. **Mount Latency (ML):** The time interval between introduction of a female Wistar rat and the first mount attempted by the male Wistar rat.
5. **Ejaculation frequency (EF) :** The time interval between first Intromission of a series to ejaculation, which is characterized by longer, deeper pelvic thrusting and slow dismount followed by a period of reduced activity.
6. **Intromission latency (IL) :** The time between addition of a receptive female into the arena and first Intromission.

Sperm Analysis

Semen Collection

The testis together with the epididymis' was excised. The distal epididymis was then cut open to expose the semen for collection by applying a little pressure on the caudal epididymis to squeeze the semen into a microscope slide. Two drops of 2.9% sodium citrate were added and the slide was covered with a cover slip for examination and evaluation under the microscope. The sperm cells were classified into non-motile, sluggish, or actively motile. The percentage of motile sperm cells was calculated by dividing the number of motile sperm cells by the total number of counted sperm cells following the method described by Osuchukwu (2016). The sperm count was carried out using the Neubauer Haemocytometer.

Sperm Motility

Semen was squeezed from the caudal epididymis onto a pre-warmed microscope slide (27°C) and two drops of warm 2.9 % sodium citrate were added, the slide was then covered with a warm cover slip and examined under the microscope using X400 magnification. Ten fields of the microscope were randomly selected and the sperm motility of 10 sperms was assessed on each field. Therefore, the motility of 100 sperms was assessed randomly. Sperms were labeled as motile, sluggish, or immotile. The percentage of motile sperm cells was defined as the number of motile sperms divided by the total number of counted sperms (i.e. 100)

Sperm viability (Life/dead ratio)

This was done by adding two drops of warm Eosin/Nigrosin stain to the semen on a pre-warmed slide, a uniform smear was then made and dried with air; the stained slide was immediately examined under the microscope using x400 magnification. The live sperm cells were unstained while the dead sperm cells absorbed the stain. The stained and unstained sperm were counted and the percentage was calculated

This was done by adding two drops of warm Walls and Ewas stain (Eosin/Nigrosin stain can also be used) to the semen on a prewarmed slide, a uniform smear was then made and air-dried; the stained slide was immediately examined under the microscope using x400 magnification Five fields of the microscope were randomly selected and the types and number of abnormal spermatozoa were evaluated from the total number of spermatozoa in the five fields; the number of

abnormal spermatozoa was expressed as a percentage of the total number of spermatozoa.

Sperm Count

This was done by removing the caudal epididymis from the right testes and blotting with filter paper. The caudal epididymis was immersed in 5 ml formol-saline in a graduated test-tube and the volume of fluid displaced was taken as the volume of the epididymis. The caudal epididymis and the 5 ml formol-saline were then poured into a mortar and homogenized into a suspension from which the sperm count was carried out using the improved Neubauer haemocytometer under the microscope.

Histology of the Testes

After weighing the testes, they were immediately fixed in Bouin's fluid for 12 hours and the Bouin's fixative was washed from the samples with 70 % alcohol. The tissues were then cut in slabs of about 0.5 cm transversely and the tissues were dehydrated by passing through different grades of alcohol: 70 % alcohol for 2 hours, 95 % alcohol for 2 hours, 100 % alcohol for 2 hours, 100 % alcohol for 2 hours and finally 100 % alcohol for 2 hours. The tissues were then cleared to remove the alcohol; the clearing was done for 6 hours using xylene. The tissues were then infiltrated in molten Paraffin wax for 2 hours in an oven at 57 OC, thereafter the tissues were embedded. Serial sections were cut using rotary microtone at 5 microns (5 μm). The satisfactory ribbons were picked up from a water bath (50-55 OC) with microscope slides that had been coated on one side with egg albumin as an adhesive and the slides were dried in an oven. Each section was deparaffinized in xylene for 1 minute before being immersed in absolute alcohol for 1 minute and later in descending grades of alcohol for about 30 seconds each to hydrate it. The slides were then rinsed in water and immersed in an alcoholic solution of hematoxylin for about 18 minutes. The slides were rinsed in water, then differentiated in 1 % acid alcohol and then put inside running tap water to blue and then counterstained in alcoholic eosin for 30 seconds and rinsed in water for a few seconds, before being immersed in 70 %, 90 % and twice in absolute alcohol for 30 seconds each to dehydrate the preparations. The preparations were cleared of alcohol by dipping them in xylene for 1 minute. Each slide was then cleaned, blotted, mounted with DPX and coverslip, and examined under the microscope. Photomicrographs were taken at x40, x100 and x400 magnifications

Statistical Analysis

Data were expressed as mean ± SEM. The mean difference between the tested groups and the control was tested using a One-Way ANOVA. Values were considered statistically significant when $p \leq 0.05$. The significant difference was assessed using the LSD Posthoc test. Computer software package SPSS version 25 was used.

Table 1. Effect of Premature Plantain on Sexual Behaviour of Wistar rats

GROUP	Control Mean ± SEM	Viagra Mean ± SEM	L.D Premature Plantain Mean ± SEM	H.D Premature Plantain Mean ± SEM	F	p-value
MF (n)	2.0 ± 1.0[a]	14.0 ± 1.0*	4.5 ± 0.5[a]	7.0 ± 0.0*[a]	47.52	0.00
ML (s)	17.5 ± 2.5	12.5 ± 2.5	12.5 ± 0.5	14.5 ± 0.5	1.72	0.30
IF (n)	4.0 ± 1.0[a]	16.0 ± 1.0*	3.5 ± 0.5[a]	3.0 ± 0.0[a]	69.74	0.00
IL (s)	21.5 ± 1.5[a]	13.5 ± 1.5*	17.0 ± 1.0	18.0 ± 2.0	4.56	0.02
EF (n)	1.0 ± 0.0[a]	4.5 ± 0.5*	1.5 ± 0.5[a]	2.0 ± 0.0*[a]	19.33	0.01
EL (s)	115.0 ± 15.0	146.5 ± 36.5	106.5 ± 0.5	109.0 ± 1.0	1.36	0.38
PEI (s)	391.0 ± 6.0[a]	241.5 ± 65.5*	284.0 ± 4.0	292.5 ±2.5	3.91	0.03

Key:

a= significant compared to control; * = significant compared to viagra

H.D Premature Plantain = High dose Premature Plantain.

L.D Premature Plantain = Low dose Premature Plantain.

MF = Mount frequency, ML = Mount latency, IF = Intromission frequency, IL = Intromission latency, EF = Ejaculation frequency, EL = Ejaculation latency, PEI = Post ejaculatory interval.

Table 2: Effect of Premature Plantain on Semen Analysis

GROUP	Control Mean ± SEM	Viagra Mean ± SEM	L.D Premature Plantain Mean ± SEM	H.D Premature Plantain Mean ± SEM	F	p-value
Normal	82.5 ± 2.5	80.0 ± 10.0	55.0 ± 7.3	57.5 ± 2.5	4.65	0.12
Abnormal	17.5 ± 2.5	20.0 ± 10.0	45.0 ± 0.0	42.5 ± 2.5	4.65	0.12
Viability	87.5 ± 2.5	82.5 ± 7.5	50.0 ± 0.0*	57.5 ± 2.5	11.68	0.04
Sperm count	550.0 ± 50.0	550.0 ± 150.0	70.0 ± 0.0	90.0 ± 10.0	7.44	0.07
pH	8.0	8.0	8.0	8.0	-	-
Volume	0.35 ± 0.05	0.30 ± 0.10	0.10 ± 0.00	0.15 ± 0.05	2.24	0.26
Appearance	milky	milky	Milky	milky	-	-
Viscosity	normal	normal	Normal	normal	-	-

H.D Premature Plantain = High dose Premature Plantain.
L.D Premature Plantain = Low dose Premature Plantain.

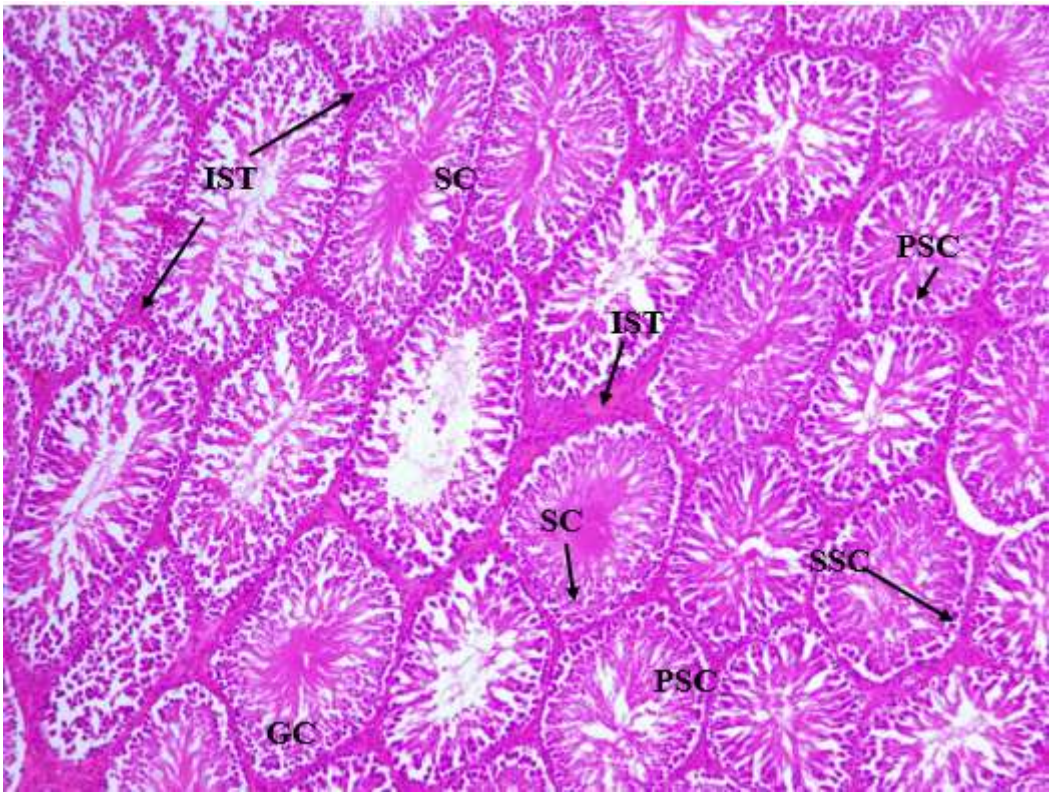

Plate 1: Photomicrograph showing section of Seminiferous tubules of tissues of Wistar rats. Rats in this group received distilled water. Section showed Sertoli cells (SC) with germinal cells (GC), primary spermatid (PSC), secondary spermatids (SSC) and interstitial tissues with Leydig cells (LC). H&E×100

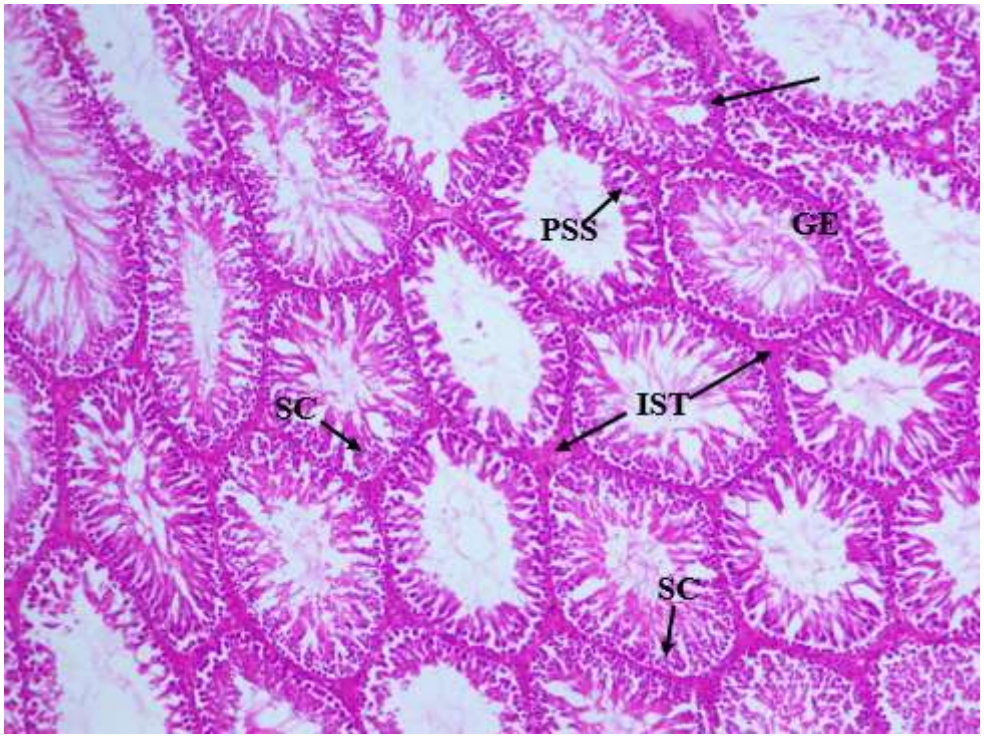

Plate 2: Photomicrograph showing section of seminiferous tubules of testis. Rats in this group received Viagra. Section displayed testicular Sertoli cells (SC), germinal epithelium (GE), primary spermatids and secondary and mature spermatocytes (PSS) and interstitium with Leydig cells. H&E×100

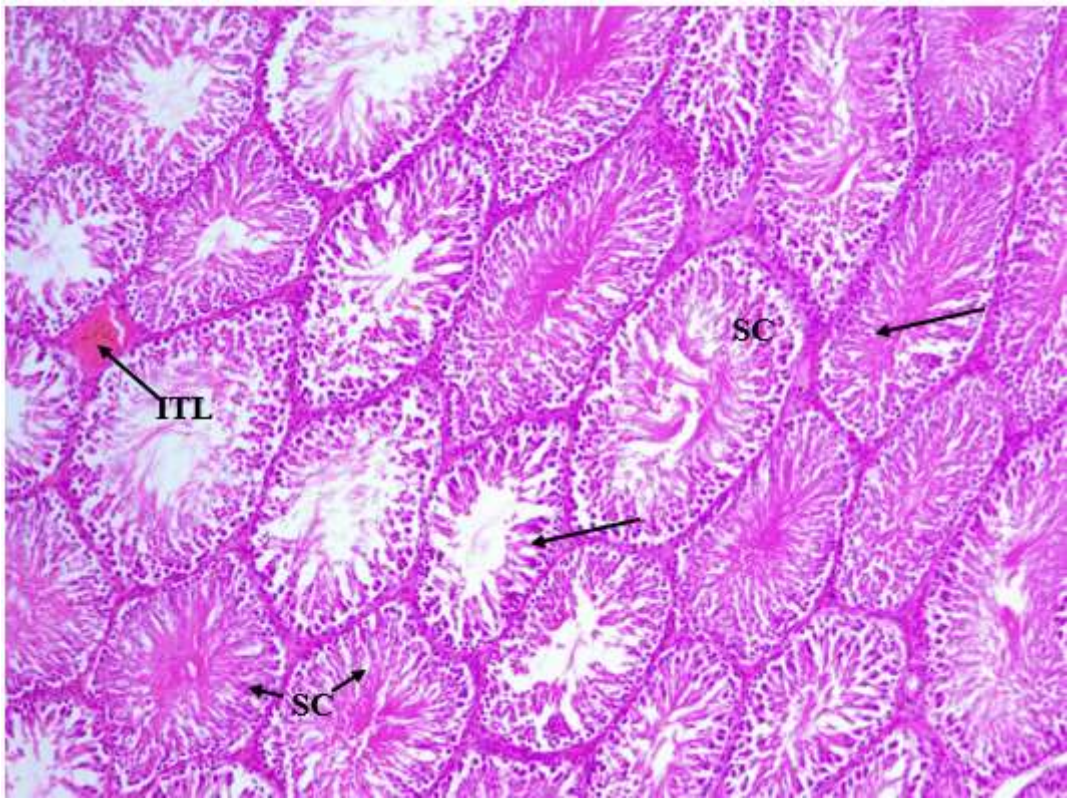

Plate 3: Photomicrograph showing sections of seminiferous tubules of testes. Rats in this group received low dose (500 mg/kg) premature plantain. Section showed some normal testicular Sertoli cells, germinal epithelium, primary spermatids and secondary and mature spermatocytes. There is mild lesions at the interstitium (ITL). H&E×100

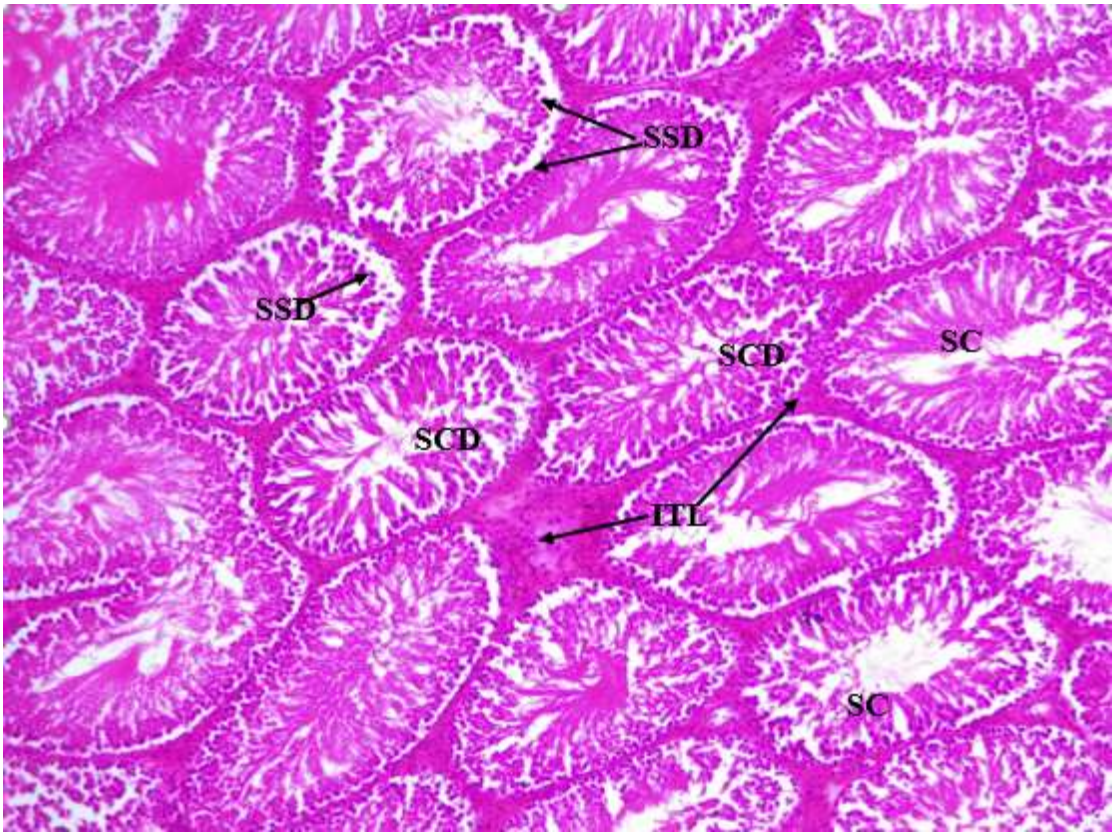

Plate 4: Photomicrograph showing sections of seminiferous tubules of testes. Rats in this group received high dose (1500 mg/kg) premature plantain. Section showed some testicular sertoli cells degeneration (SCD), germinal epithelium, primary spermatids and secondary and mature spermatocytes distortion (SSD). Interstitial lesions was observed, (ITL). H&E×100

DISCUSSION

Mount latency and Intromission latency decreased significantly when compared to the control in bay leave treated rats. Mount latency and Intromission latency also decreased significantly in premature plantain treated rats. This implies that premature plantain and bay leaves are likely to enhance sexual appetite/motivation and arousal. This agrees with Yakubu and Afolayan (2009); Victor et al. (2023) and Fouche et al. (2015), they stated that plant extracts capable of decreasing mount and Intromission latencies enhances sexual appetite and motivation.

Ejaculation frequency increased significantly in both premature plantains treated rats. This implies that this plant may likely have some aphrodisiac properties. This agrees with Fouche et al. (2015). They stated that increase in ejaculation frequency indicates enhanced aphrodisiac effect of the plant.

Ejaculation latency was prolonged in the present study. This indicates that the plant exerts some aphrodisiac effect i.e the extract and standard drug prolonged the duration of coitus (an indicator of increase in sexual motivation). The result obtained from the sexual behavioral test in the present study agrees with Wattanathorn et al. (2012), they stated that prolongation of ejaculation latency suggests prolonged duration of coitus, which is an indicator of increase sexual motivation. It also indicates enhanced copulatory performance.

Post ejaculatory interval in the present study reduced indicating that the plant extract sustained increased sexual activity. This result agrees with Yakubu and Akanji (2011), who stated that a reduction in post ejaculatory interval is an indication of sustained increase in sexual activity.

CONCLUSION

Premature plantain fruits enhanced sexual desire and copulatory performance and outcomes. This plant may likely improve libido, potency and sexual pleasure.

REFERENCES

I. Yakubu, M.T., Afolayan, A.J. (2009). Effect of aqueous extract of Bulbine natalensis (Baker) stem on the sexual behaviour of male rats. Int J Androl.;32:629–36.

II. Fouche, G., Afolayan, A.J., Wintola, O.A., Khorombi, T.E., Senabe, J. (2015). Effect of the aqueous extract of the aerial parts of Monsonia angustifolia E. Mey. Ex A. Rich., on the sexual behaviour of male Wistar rats. BMC Complement Altern Med. 15:343. doi: 10.1186/s12906-015-0880-4.

III. Victor, P. D., Krukru, E.E., Okpara, P. E., Ajie, P.C., Reuben, E.,Amadi-Ikpa, H.A., Wami-Amadi, C.F., Otto, B.J., Dan-Jumbo, D., Nkpurukwe, C.I. (2023). The Effect of Ethanolic Extract of "*Laurus Nobilis*" (Bay Leaves) on The Reproductive

Characteristics of Male Wistar Rats. *Scholars International Journal of Obstetrics and Gynecology*. 6(4): 156-162.
DOI: 10.36348/sijog.2023.v06i04.005

IV. Wattanathorn, J., Pangphukiew, P., Muchimapura, S., Sripanidkulchai, K., and Sripanidkulchai, B. (2012). Aphrodisiac Activity of Kaempferia parviflora **.** American Journal of Agricultural and Biological Sciences 7 (2): 114-120, ISSN 1557-4989

V. Yakubu M.T. and Akanji (2011). Effect of Aqueous Extract of *Massularia acuminata* Stem on Sexual Behaviour of Male Wistar Rats. Evid Based Complement Alternat Med.
doi: 10.1155/2011/738103

VI. Tajuddin, A, Ahmad, S., Latif, A.and Qasmi, I.A. (2003). Effect of 50 % ethanolic extract of Syzygium aromaticum (L.) Merr. & Perry. (clove) on sexual behaviour ofnormal male rats. BMC Complement Altern Med.;3:6

VII. Chauhan, N.S., Sharma, V., Thakur M, Dixit VK. (2013). Pueraria tuberosa DC Extractimproves androgenesis and sexual behavior via FSH LH Cascade. Scientific World Journal.;2013:78065

VIII. Bahmanpour S., Talaei T., Vojdani Z.,Panjehshahin M.R., Poostpasand A., Zareei S.,Ghaeminia M.(2006): Iran. J. Med. Sci. 31, 208

IX. Elizabeth Eepho Krukru, Dagbota Dan-Jumbo, Progress Dakuro Victor, Elile Peace Okpara4, Cedar PatrickInanum, Progress Baridi, Buduka Justice Otto. (2025). Effects of Corchorus Olitorius Leaves and Stem Ethanolic Extract on SeminalQuality and Testicular Histology in Male Wistar Rats. International Journal of Pharmaceutical and Bio-Medical Science. ISSN(print): 2767-827X, ISSN(online): 2767-830XVolume 05 Issue 03.

X. Carro-Juárez Miguel; E Cervantes; M Cervantes-Méndez; Gabriela Rodríguez-Manzo. Aphrodisiac properties of Montanoa tomentosa aqueous crude extract in male rats. Pharmacology Biochemistry and Behavior 78(1):129-34.
DOI: 10.1016/j.pbb.2004.03.001