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Indian Wood Nettle as a Natural Sexual Tonic: A Preclinical Study on Libido and Copulatory Behavior in an Animal Model

Nwafor C. Charles[1*], Ifedi I. Charles[2], Emeka Ugwuishi[1], Ojimba M. Immaculata[3], Okafor K. Oluchi[4]

[1]Department of Human Physiology, Faculty of Basic Medical Sciences, Enugu State University of Science and Technology, College of Medicine, Parklane, Nigeria
[2]Department of Human Physiology, Faculty of Basic Medical Sciences, College of Health Sciences, Chukwuemeka Odumegwu Ojukwu University Uli, Nigeria
[3]Department of Pharmacy, Faculty of Pharmaceutical Sciences, Chukwuemeka Odumegwu Ojukwu University Uli, Nigeria
[4]Department of Human Physiology, Faculty of Basic Medical Sciences, College of Medicine, University of Nigeria, Enugu Campus, Nigeria

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***Corresponding author:** Nwafor C. Charles
Department of Human Physiology, Faculty of Basic Medical Sciences, Enugu State University of Science and Technology, College of Medicine, Parklane, Nigeria

Abstract | **Original Research Article**

The renowned androgenic performance of *Indian wood nettle* (*Laportea gestures*), popularly known as Ile-nkita in Igbo, which are used by Nigerian herbalists, were examined using forty (40) male Wistar rats weighing 151.8–199.5g, which were split into four (1-4) groups of ten rats each. While groups 2, 3, and 4 received 40, 80, and 160 mg/kg of the extract, respectively, group 1 served as the control. Following their pairing with a receptive female (1:1), the male rats' mating behaviours were observed. According to the findings, the extract at 40, 80, and 160 mg/kg considerably reduced the latencies of mount and intromission ($P<0.05$) while increasing the frequency of mount and intromission. Additionally, ejaculation frequency was positively correlated with ejaculation latency ($P<0.05$). The extract decreased the prolactin, post-ejaculatory interval, and percentage of slow, aberrant, and dead sperm in the Wistar rats compared to the control. Consequently, this study confirms the aphrodisiac qualities of *Indian wood nettle* in traditional Nigerian medicine.

Keywords*:* Indian Wood Nettle, Laportea Aestuans, Sexual Performance, Mating Behaviors.

INTRODUCTION

The word for the goddess of sex, love, and beauty is aphrodisiac – described as any chemical, substance or drug that increases libido, especially in males. Humans have wanted to maintain a firm erection and enhance their sexual abilities since the beginning of time (Ramandeep *et al.*, 2013). Still, one of the main reasons for divorce in Nigeria's sociocultural context is the inability to consistently get or keep an erection strong enough for sex (Haghmorad *et al.*, 2019). Male factors are responsible for over half of divorce cases, with the most common causes being poor sperm quality, weak erections, and decreased sexual desire (Agarwal *et al.*, 2016, Naghdi *et al.*, 2016).

In this age of advanced biomedical technology, pro-aphrodisiacs and fertility drugs, including the well-known oral prescription for Viagra (Sildenafil), in vitro fertilization (IVF), sperm freezing, and donation procedures, are used to treat male sexual inabilities. These methods, however, are impractical for certain men, and they only work for about half of the men with different causes and negative consequences (Ataman & Sakpa, 2018). Because of this, men are now looking for nutrients and other substances that will help them maintain a hard erection during coitus and increase their sexual power. The concept of bioactive aphrodisiacs made from plants, animals, or minerals has intrigued people throughout recorded history.

In developing countries such as Nigeria, medicinal plants are used as a substitute for contemporary treatments (Royère *et al.*, 2011, Amah-Taria *et al.*, 2016, Ifedi *et al.*, 2023).

Laportea aestuans is a special medicinal plant that is a member of the Urticaceae family. Traditional Nigerian medicine makes extensive use of it. In ethnomedicine, the plant's pulp is consumed, and its sap is used to treat hernias and as an anthelmintic. The pulp

is externally applied to children's bodies to treat ulcers, oedema, and fevers. The leaves have laxative and diuretic properties. They are frequently added to soups to help with indigestion, constipation, and stomachaches, among other digestive problems. Urinary retention, bedwetting, haemorrhages, filariasis, rheumatism, and menopausal issues are all treated with an infusion of the leaves. In order to treat gonorrhoea, the dried leaves are ground up, combined with water, and then consumed (Agbodjento *et al.*, 2020).

Laportea aestuans fractions and methanol leaf extract's gastroprotective qualities were investigated in rats (Akah *et al.*, 2009). Christensen *et al*., (2015), found that pregnant women in Ghana experienced antacid activity when Laportea aestuans leaves were mixed with CaCO3. Many of the chemical components in Laportea aestuans leaves that have important biological activities have been investigated and described by a number of researchers. They found alkaloids, tannins, resins, saponins, carbohydrates, flavonoids, cardiac glycosides, steroids, anthraquinones, and terpenes in addition to alkaloids, tannins, resins, saponins, carbohydrates, flavonoids, cardiac glycosides, steroids, anthraquinones, and terpenes (Okereke *et al*., 2014; Ganiyat *et al*., 2014; Essiett *et al*., 2011, Charles *et al*., 2021, Nwafor *et al*., 2021). Although herbalists have been known to regularly use the leaves of *Laportea aestuans*, no scientific research has examined the plant's aphrodisiac properties using laboratory rats as models. The ongoing investigation is justified by this.

METHODOLOGY

Preparation of Extract

After being gathered and washed with water, fresh *Laportea aestuans* leaves were assigned the herbarium number UPH/P/263 by the Department of Plant Sciences and Biotechnology's herbarium at the University of Port-Harcourt in Choba, Nigeria. With a few modest adjustments, Al-Attar and Abu Zeid's (Al-Attar & Abu 2013, Charles *et al.*, 2021, Charles *et al.*, 2025) method was used to make the extract.

Ethical Approval

Our institutional ethical committee has given its approval to the following study:
UPH/CEREMAD/REC/MM78/052.

Toxicity Test of the Extract

The rats did not exhibit any signs of death when exposed to the oral LD50 of Laportea aestuans extract (LAE) at 6000 mg/kg (Lorke 1983).

Experimental Design

For the investigation, 40 adult Wistar rats were used. The weight of the rats varied between 151.8 and 199.5 grammes. They were bought from the UNEC Animal House, Nigeria, and housed in plastic cages with unlimited access to tap water and a typical rat pelleted diet in regular conditions (temperature 25–29°C and natural light/dark cycle). There was a 14-day acclimatisation period for the animals.

Animal Placement/Inducement

The rats were separated into four groups of ten after being acclimated and weighed. Treatments administered to rat groups included the following:
Group 1 (Control group) was given simply rat meal and tap water ad libitum.
Group 2 (Low dose extract group) received 40mg/kg of *Laportea aestuans* leaf extract orally.
Group 3 (Medium dose extract group) received 80mg/kg of *Laportea aestuans* leaf extract orally.
Group 4 (High dose extract group) received 160mg/kg of *Laportea aestuans* leaf extract orally.
Treatments lasted for 30 days.

Mating Behavior Test

The test was carried out using the mating behaviour technique developed by Yakubu and Akanji (2011). Male rodents that are sexually experienced and in good condition, and who engage in active sexual behaviour, have been chosen for the study. After obtaining the extract, male animals were taken to the study facility, where they were exposed to red dim light for three to six days before the experiment (in a 14' 14' lab using a 1 w fluorescent tube). By administering a suspension of ethinyl estradiol orally at a rate of 100 mg/kg 48 hours prior to the pairing and subcutaneous progesterone at a dose of 1 mg/kg 6 hours prior to the experiment, female mice were tricked into going into oestrous.

To guarantee their receptivity prior to the test, female animals were introduced to males other than the control and test animals. Only the most receptive ladies were included in the study. The experiment was conducted at 20:00 hours in the same lab with same lighting. One female for every male animal was put in the cages containing the receptive females. During the first two mating series, mating behaviour was observed immediately. The test was stopped if the guy did not show sexual interest. Another artificially "warmed" female animal was used to replace any female that did not exhibit any symptoms of receptivity.

The following aspects of male sexual behavior were observed:

The act of a male animal mounting on a female's back is known as the mount latency (ML). The number of times a male animal mounts a female without any intromissions is known as the mount frequency (MF). The copulatory activity known as the intromission latency (IL) occurs when a male animal's genital organ enters a female animal's vaginal opening. The number of times a male animal's genital organ enters a female vaginal opening is known as the intromission frequency (IF).

The time it takes for a male animal to ejaculate after being near a female is known as the ejaculatory latency (EL).

Ejaculation frequency is the number of times the male rat ejaculates during the copulation sequence. The postejaculatory interval is the period of time between ejaculation and the subsequent intromission. Copulatory effectiveness (CE) is calculated using the fo rmula CE=IF/(MF+IF).

Furthermore, the IF/EL ratio was computed. It shows how effective the copulation was. IL, IF, and CE were not counted or compared when at least one animal in a group did not ejaculate or have intromissions.

The average interval between mounts and intromissions is known as the Inter-copulatory Interval (ICI). Divide the total number of mounts and intromissions by the number of intromissions. EL/IF = ICI. The proportion of mounts that result in vaginal penetration relative to the total number of mounts is known as the copulatory efficiency (CE). CE = IF/M F×100

Determination of Particulate Parameters

(a) Sperm Parameters Determination

The sperm in the epididymis were counted using the MALASSEZ hemocytometer. The (Kyrian *et al.*, 2015, Nwoke *et al.*, 2014) approach was used to assess the sperm quality.

b) Serum Hormone Assays Determination

Serum levels of prolactin, testosterone, follicle stimulating hormone, and luteinizing hormone were measured using the enzyme linked immunosorbent assay (ELISA).

Statistical Analysis

A statistical analysis was conducted and all data were presented as mean S.E.M. The two groups were compared using a one-way analysis of variance (ANOVA). Values were deemed significant when $P<0.05$.

RESULTS

As can be seen below, all of the study's results were arranged in tables and presented as mean plus/minus standard error of mean (S.E.M).

Table 1: Obtained values for body weight in research animals

Groups	Initial body weight	Final body weight	Difference in body weight	% Difference
Control	131.40±2.42	143.60±0.01	12.20±0.00	**9.28**
LA 40mg/kg	125.40±3.22	147.00±0.04	21.60±0.02[a]	**17.23**
LA 80mg/kg	159.00±2.92[a]	195.00±0.11[a]	36.00±0.33[a]	**22.64** [a]
LA 160mg/kg	140.00±5.83[a]	199.60±0.20[a]	59.60±0.13[a]	**44.60** [a]

Key: Values are presented as mean ± sem. n= 5. [a] = mean values are statistically significant compared to control.

Table 2: Obtained values for some organ weights in research animals

Organs		Control	%diff	LA40	%diff	LA80	%diff	LA160	%diff
Testes	initial	1.70±0.00	**7.06**	1.79±0.00	**6.15**	2.21±0.01	**8.60**	2.90±0.25	**10.35**
	final	1.82±0.04		1.90±0.01		2.40±0.25		3.20±0.20	
Epididymis	initial	1.18±0.00	**5.93**	0.41±0.02	**7.32**	0.55±0.01	**7.27**	0.67±0.04	**7.50**
	final	1.25±0.02		0.44±0.0		0.59±0.03		0.72±0.01	

Table 3: Obtained values for male copulatory parameters in research animals

Groups	Mount Lat	Mount Freq	Intro Lat	Intro Freq
Control	86.20±0.50	43.22±0.80	57.60±0.00	12.40±1.01
L.A(40mg/Kg)	63.40±0.80	40.02±0.13	44.10±0.09[a]	17.00±1.03[a]
L.A(80mg/Kg)	77.00±0.33 [a]	31.55±5.00	46.20±0.00[a]	16.20±1.00
L.A(160mg/Kg)	71.70±0.88 [a]	26.00±1.05[a]	53.90±0.03	17.80±1.09[a]

Key: Values are presented as mean ± sem. n= 5. [a] = mean values are statistically significant compared to control.

Table 4: Obtained values for male ejaculatory parameters in research animals

GROUPS	Ejaculatory Latency	Ejaculatory Frequency	Post Ejaculatory Intervals
CONTROL	91.55±0.20	12.00±3.00	102.30±7.06
LA(40mg/kg)	100.33±0.07	13.00±1.00	96.50±3.08
LA(80mg/kg)	102.70±0.03[a]	18.00±3.04[a]	88.90±0.00[a]
LA(160mg/kg)	111.30±0.06[a]	18.00±0.09[a]	97.30±1.05

Key: Values are presented as mean ± sem. n= 5. [a] = mean values are statistically significant compared to control.

Table 5: Obtained values for male computed mating parameters in research animals.

Groups	Intercopulatory interval	Copulatory efficacy	Copulatory efficiency (%)
Control	7.40±0.19	0.22±0.55	28.70±5.00
LA(40mg/kg)	5.90±0.07[a]	0.29±0.33	42.50±4.33[a]
LA(80mg/kg)	6.34±0.03	0.34±0.29[a]	51.34±7.21[a]
LA(160mg/kg)	6.25±0.06	0.41±0.37 [a]	68.46±4.00[a]

Key: Values are presented as mean ± sem. n= 5. [a] = mean values are statistically significant compared to control.

Table 6: Obtained values for male reproductive hormones in research animals

GROUPS	LH (miu/ml)	FSH (miu/ml)	TEST (ng/ml)	PRL (ng/ml)
CONTROL	0.75 ± 1.04	0.20 ±1.00	0.67 ± 0.03	1.63 ± 0.08
LA (40mg/kg)	1.33 ± 0.90	0.53 ± 7.11 [a]	0.94 ± 0.07[a]	1.40 ± 0.00[a]
LA (80mg/kg)	2.05 ± 0.11[a]	0.47 ± 3.66[a]	0.85 ± 0.00[a]	0.56 ± 0.05[a]
LA(160mg/kg)	1.40 ± 0.36 [a]	0.43 ± 0.22	0.90 ± 0.03[a]	1.70 ± 0.03

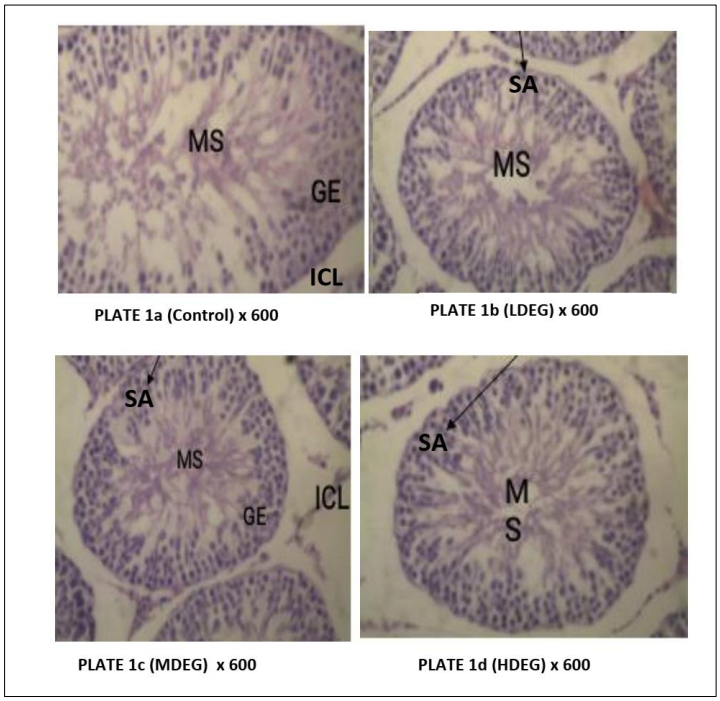
Key: Values are presented as mean ± sem. n= 5. [a] = mean values are statistically significant compared to control.

Table 7: Obtained values for sperm parameters in research animals

	Groups			
Parameters	**1 (Control)**	**2 (LA40)**	**3 (LA80)**	**4 (LA160)**
Volume (ul)	0.2±0.01	0.2±0.03	0.4±0.02 [a]	0.3±0.02
pH	7.5±0.01	8.3±0.01	8.7±0.01	8.5±0.01
Viability (%)	93±0.20	86±0.33	98±3.22	89±1.20
Sperm Count	650±0.22	600±0.10	700±0.30 [a]	900±0.42 [a]
Normal Sperm (%)	85±1.01	81±3.00	93±0.00 [a]	95±2.02 [a]
Abnormal (%)	50±0.50	44±0.03	40±0.80 [a]	35±0.20[a]
Active (%)	70±0.21	85±2.55 [a]	75±0.33	80±0.15 [a]
Sluggish (%)	20±0.05	13±0.01 [a]	15±0.07	12±0.03 [a]
Dead	30±0.24	15±0.10 [a]	19±0.30 [a]	14±0.20 [a]

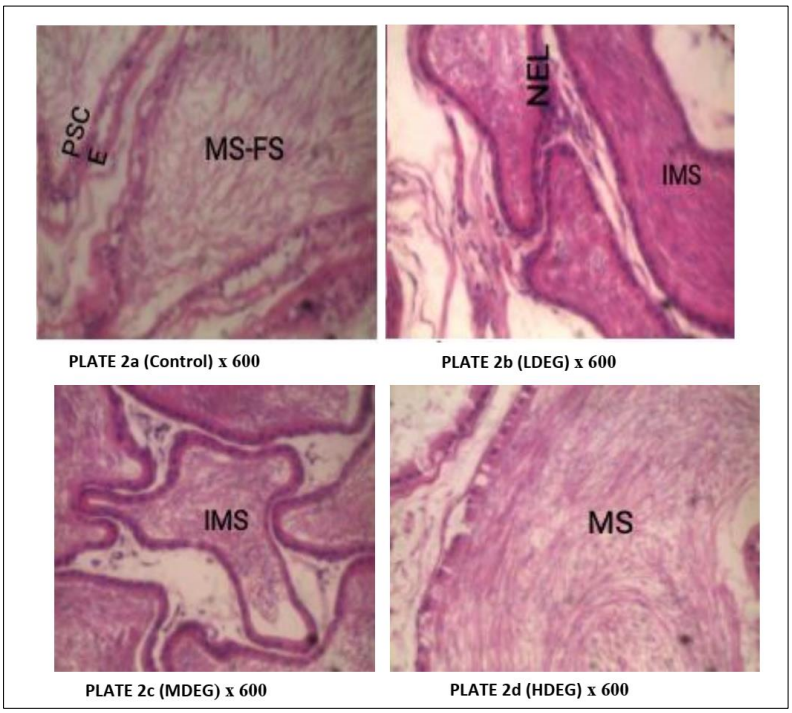
Key: Values are presented as mean ± sem. n= 5. [a] = mean values are statistically significant compared to control.

Testicular Histology



Key: SA= spermatogenic activity, **MS**= mature spermatozoa, G**E**= germinal epithelium, **ICL**= interstitial cells of leydig

Histology of the Epididymis



Key: PSCE= pseudostratified columnar epithelium, **MS-FS**= mature spermatozoa (flagellated structures), **NEL**= normal epithelial lining, **IMS**= immature spermatozoa

DISCUSSION OF FINDING

Animal sources of sexual power or aphrodisiac plants are a major source of concern due to their negligible or nonexistent negative effects. Numerous substances originating from plants and animals have been utilised as aphrodisiacs in traditional medicine across different cultures; some of these substances have been identified pharmacologically to apply their effects on the HPG axis (Olabiyi *et al.,* 2019). Plant parts are now frequently used in folk medicine to increase libido. To find out how effective Laportea aestuans leaves are as a sexual enhancer, the study used adult male rats as its model. The characteristics of male rat copulatory behaviour, including ML, MF, IL, IF, EL, EF, and PEI, were examined in this study. Indicators of sexual drive include mount latency and intromission latency. Numerous mounts and intromissions are helpful markers of libido, potency, and energy. A higher frequency of mount (MF) indicates sexual drive, while a higher frequency of IF indicates penile orientation, erection competence, and the ease with which ejaculatory reflexes are triggered (Singh *et al.*, 2013). Ejaculation frequency and latency are markers of sexual performance and facilitation. Better copulatory performance and longer coitus length are indicated by higher EL and EF, and vice versa. A useful measure of potency, desire, and the rate of recovery from exhaustion (IL) is the postejaculatory interval following the initial set of mating. After delayed mating, a higher PEI denotes a slower rate of recovery or recuperation, while a lower PEI denotes a quicker recovery following copulation (Dasofunjo *et al.*, 2019).

The influence of Laportea aestuans extract on mating behaviours led to a substantial decrease in Mount and Intromission Latencies and a corresponding rise in Mount and Intromission Frequencies across all experimental groups. Thus, enhanced libido and aphrodisiac adequacy are suggested by better MF and IF with Laportea aestuans medicine in the current study, which is in line with (Sanjay *et al.,* 2018, Charles *et al.,* 2021) research. Libido may have increased as a result of the extract's stimulatory actions on the HPG-axis, which influences reproductive activities.

The leaves of Laportea aestuans extract contain a number of bioactive components, such as tetrahydroxyflavone and other polyphenolic compounds (Green *et al.,* 2021, Charles *et al.,* 2021). It has been demonstrated that the antioxidant qualities of tetrahydroxyflavone and its glycosides lower the production of free radicals and other reactive oxygen species products (ROS).

By products of aerobic metabolism, ROS have the potential to alter malignant cells (Nwafor *et al.,* 2024). Then, ROS can harm proteins, lipids, or DNA (Charles *et al.,* 2025). At submicromolar concentrations, tetrahydroxyflavone is a potent forager of superoxide anion, hydroxyl radical, and peroxynitrite; however, it also inhibits pro-oxidant chemicals such as xanthine oxidase and activates antioxidant enzymes such as superoxide dismutase, catalase, and heme oxygenase-1, as well as preventing xanthine from producing hydroxyl radicals (Ighodaro and Akinloye 2018). Moreover, and

perhaps most significantly, tetrahydroxyflavone contains hydroxyl groups at C3, C5, and C4, an oxo group at C4, and a double bond at C2-C3, all of which support its antioxidant or cancer-prevention potential (Lázaro 2011). The results of this study showed that tetrahydroxyflavone increased mating behaviours by eliminating ROS generated in the rats' plasma and regeneration tissues.

By raising LH levels, the saponins in the leaf extract might have helped to stimulate an increase in the body's natural endogenous testosterone levels. Studies have reported that saponins have androgic properties that enhance sexual enhancer potential. Testosterone levels are maintained by the pituitary organ's release of LH (Mahaneem *et al.*, 2021). Contrarily, alkaloids have been demonstrated to improve sexual performance and maintain male erection by increasing blood flow in the sexual organs through vasodilation (Agbodjento *et al.*, 2020). Photomicrographs of the rat's testicles are displayed in PLATE 1a to d. PLT 1a demonstrated a normal interstitial cell of leydigs (ICL) and stratified germinal epithelium (GE) of the testes in the control group. Mature spermatogenic cells and sertoli (supporting cells) comprise the germinal epithelium. The germinal epithelium's layers each represent a distinct stage of the spermatozoa's growth. Plate 2a displays the results of photomicrographs of the rat's epididymis, which show that the epididymis is packed with mature spermatozoa (flagellated structures). The extract increased spermatogenic activity in PLT 1b (LDEG), PLT 1c (MDEG), and PLT 1d (HDEG). Interstitial cells and spermatogenic cells were larger and more distinct when leydigs were compared to the control group, and mature spermatozoa were found in the lumen of seminiferous tubules. According to Akomolafe *et al*., (2017), androgens, primarily FSH and testosterone, are known to play a crucial role in the development of male reproductive processes. Plates 2b–c show the epithelial lining in its natural state, and Plate 2d shows the epithelial lining in its natural state. The spermatozoa in Epidydimis are mature, and the increase in spermatogenic activity observed in the present study is linked to testosterone release in the rats treated with the extract, as demonstrated by histological data. Additionally, the extract group exhibited testosterone release, which may account for the extract's improved spermatogenesis. The role of androgen in spermatogenesis, sperm maturation, and the development of sexual desires is well recognised. These results suggest that the reproductive endocrine status of Wistar rats was affected by the extract and reference molecule treatments.

CONCLUSION

All things considered, our results indicate that the leaf extract of Laportea aestuans has sexual enhancer viability, which may be related to the extract's antioxidant qualities. This strengthens the effectiveness of Laportea aestuans leaves as an aphrodisiac or sexual enhancer in traditional Nigerian medicine.

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