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Aphrodisiac Potential of *Securidaca Longipedunculata* Stem-bark Methanol Extract on Male Albino Rats

Angela Nnenna Ukwuani-Kwaja, Abdulhamid Zubairu, Binta Saidu*, Yusuf Sani, Jibril Muhammed, Umar Usman Maidahini, Ibrahim Zakariya Lafiya and Kabiru Salihu

Department of Biochemistry, Faculty of Life Sciences, Abdullahi Fodio University of Science and Technology Aliero, Kebbi State, Nigeria.

Corresponding Author: Binta Saidu, Department of Biochemistry, Faculty of Life Sciences, Abdullahi Fadio University of Science and Technology Aliero, Kebbi State, Nigeria.

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Abstract

Sexual dysfunction in male (hypogonadism erectile and ejaculatory disorders,) is a significant global public health issue, affecting over 20% of males. While synthetic therapies exist, their adverse effects drive interest in plant-based alternatives. Securidaca longipedunculata is traditionally used for enhancing sexual function, but scientific validation is limited. This study evaluated the aphrodisiac efficacy of S. longipedunculata stembark methanol extract on male albino rats. Phytochemical screening using standard protocols revealed tannins, flavonoids, steroids, and alkaloids. Fifteen rats were divided into five groups (n=3): Group 1 (control, distilled water 5mL/kg), Group 2 (standard, sildenafil citrate 5 mg/kg), and Groups 3–5 (received extract at 100, 200, 400mg/kg b. wt respectively). Extract and sildenafil citrate were ingested daily for 14 days. Mating behaviors: Post-ejaculation interval (PEI), ejaculation latency (EL), mount frequency (MF), intromission frequency (IF), mount latency (ML), and intromission latency (IL), were recorded at baseline (week 0), week 1, and week 2. Post-treatment mating performance was also assessed. Baseline parameters showed no significant differences ($P > 0.05$). Post-treatment, extract- and sildenafil-treated groups exhibited significant ($P < 0.05$) reductions in PEI IL, and ML, compared with controls. EL increased significantly ($P < 0.05$) in all treated groups, while IF showed non-significant elevation ($P > 0.05$). Dose-dependent improvements in mating performance were observed in extract groups. S. longipedunculata stembark methanol extract demonstrated significant aphrodisiac activity, likely mediated by its bioactive constituents. These findings validate its traditional use as a sexual enhancer and warrant further investigation into its mechanisms of action.

Key words: Aphrodisiac, mating behavior, Securidaca longipedunculata, stembark, Phytochemicals

1. Introduction

Male sexual dysfunction (MSD) encompassing hypogonadism, ejaculatory disorders and erectile dysfunction constitutes a significant global public health concern, affecting over 20% of males across age groups [1]. This dysfunction is among the frequent genesis that results to infertility and is studied to manifest in several models such as; inhibited or delayed ejaculation, retrograde or untimely ejaculation, low sexual drive and impotency [2]. Erectile dysfunction, also known as impotence refers to frequent lack of ability to maintain or realize an erection sufficient for satisfactory sexual intercourse [3]. Although not regarded a life-threatening health situation, it is accompanied by serious medical and social issues which may result more serious and perturbing health conditions including hypertension, hormonal imbalance, neurogenic diseases, and diabetes [4].

Aphrodisiacs are substances which increase sexual desire, pleasure stimulation, performance and are also theraphies used to manage some types of erectile dysfunction [5]. In ethno-medicine several medicinal plants including *Securidaca longipedunculata* are known to have pro-sexual activities [6]. Due to adverse effect of several synthetic drugs, herbal medicines are generally considered to be safe and effective therapeutic agents [7].

Securidaca longipedunculata, is a highly valued medicinal plant commonly known as the violet tree, in many African countries [8]. Its roots, bark, and leaves are used traditionally to manage several ailments, such as fungal infections, fever, malaria, venereal diseases, toothache, and pain [9,10]. It's also used as an aphrodisiac and to treat conditions like epilepsy, rheumatism, and skin infections [11].

2. Materials and Methods

2.1. Collection and Identification of Plant Sample

Securidaca longipedunculata stembark was collected in April 2025 in Aleiro, Aleiro Local Government Area of Kebbi State. The plant was authenticated by a Taxonomist from Department of Plant Science and Biotechnology, Abdullahi

Fodio University of Science and Technology, Aleiro. And a Voucher specimen Number (ksusta/psb/h/voucher no: 287) was assigned and the plant was kept in the herbarium of the same Department.

2.2. Plant Preparation and Extraction

Clean water was used to wash the stembark of the plant and subsequently allowed to dry under canopy for 14days. It was then grinded to coarse powder using grinding machine. One hundred grams (100g) of the grounded stembark was soaked in 250mls of 100% methanol (Loba Chemie Pvt Ltd. Mumbai, India) for 3days [12]. The extract was then sieved using muslin cloth and Number 1 filter paper, oven fixed at 45oC was used to evaporated the solvent and the dried extract was refrigerated in air tight container at 4°C.

2.3. Experimental Animals

The Wistar albino rats used in this study were bought from Animal House, Usmanu Danfodiyo University, Sokoto in February, 2025. Well ventilated rubber cages were used to transport the animals to, Faculty of Life Sciences, Abdullahi Fodio University of Science and Technology, Aleiro's Animal House. Before the commencement of the research, the animals were acclimatized for 14days (2weeks) and were allowed access to water *ad libitum* and fed with standard animal feed.

2.4. Phytochemical Screening of *Securidaca longipedunculata* Stembark Methanol Extract

The Phytochemical screening for flavonoids, tannins, steroids, saponins, glycosides, alkaloids and phenols were conducted in accordance with the guidelines described by Harbone, (1973), Safowara, (1993); Trease and Evans, (1989) [13,14].

2.4. Aphrodisiac Studies

2.4.1 Mating Behaviour

Hasty sexual activity and agile male albino rats together with female animals showing regular oestrus cycle were choose for the research and were categorized into five (5) groups of three (3) animals each and treated as follows; group I received distilled water orally (5ml/kg), group II received sildenafil citrate (5mg/kg), while group III, IV and V received *Securidaca longipedunculata* stembark methanol extract 100, 200 and 400mg/kg. standard drug and extract were administered daily for two weeks. The male rats were isolated in square plastic cages for 10 minutes to acclimatized prior introducing the female after 10minutes, the female rats were couple male rats individually 1:1 and the mating behaviors [mount frequency (MF), mount latency (ML), intromission requency (IF), intromission latency (IL), Post ejaculatory interval (PEI) and Ejaculation latency (EL) were observed before treatment (initial week) and first week and second week.

2.4.2. Mating performance Test

On the 15th day, each male rat from all the groups were separately coupled with three female animals for 24 hours. The following day morning, vaginal smear of each female rat was assess for the presence of sperm. The number of sperm-positive females was recorded in each experimental group and compared with control.

Animals were grouped and treated as follows:

Group I: Normal control administered distilled water 5ml/kg b.w on a daily basis for 14 days.
Group II: Positive control administered (sildenafil citrate 5mg/kg).
Group III: Received *S. longipedunculata* stembark methanol extract 100 mg/kg b.w once daily for 14 days.
Group IV: Received *S. longipedunculata* stembark methanol extract 200 mg/kg b.w once daily for 14 days.
Group V: Received *S. longipedunculata* stembark methanol extract 400 mg/kg b.w once daily for 14 days.

2.5 Statistical Analysis

Date generated in this study were expressed as means ± standard error of mean (SEM). Values having similar superscript are not-significant P>0.05. Means are compared using one-way analysis of variance (ANOVA) followed by Duncan's multiple comparison test. The data were analysed with SPSS software version 20.

3. Results

3.1. Phytochemical Composition of *Securidaca longipedunculata* Stembark Methanol Extract

The results for phytochemical screening of Securidaca longipedunculata stembark methanol extract is presented in table 1. The result revealed the presence of tannins, flavonoids, steroids, saponins, glycoside and alkaloids, while phenol is not detected.

Phytochemicals	Extract
Flavonoids	+
Tannins	+
Steroids	+
Saponins	+
Glycosides	+
Alkaloids	+
Phenols	-
KEY: + = Present, - = Not detected	

Table 1: Qualitative Phytochemical Constituents of *Securidaca longipedunculata* Stembark Methanol Extract

3.2. Aphrodisiac Potential of *Securidaca longipedunculata* Stembark Methanol Extract on Male Albino rats

The aphrodisiac potential of *Securidaca longipedunculata* stembark methanol extract on male albino rats is presented in Table 2. At week one (before the administration of extract and standard drug), there are no significant (P>0.05) differences in mount frequency, mount latency, intromission frequency, intromission latency, ejaculation latency and post ejaculation interval between all the groups (normal control, sildenafil citrate (positive control), extract 100, 200 and 400mg/kg b. wt) respectively. However, after one week of treatment (week 1) a significant (P<0.05) decrease in mount latency and post ejaculation interval were observed in sildenafil citrate (positive control), extract 200 and 400mg/ kg b. wt treated groups compared to normal control, mount frequency revealed significant decrease only in groups treated with sildenafil citrate (positive control) and extract 200 mg/kg b. wt compared to normal control. Intromission latency revealed significant (P<0.05) decreases only in groups treated with sildenafil citrate (positive control), extract 200 and 400mg/kg b. wt compared to normal control. However, Ejaculation latency revealed significant (P<0.05) increase only in groups treated with sildenafil citrate (positive control), extract 200 and 400mg/ kg b. wt compared to normal control. At second week of administration (week 2) mount latency and intromission latency significantly (P<0.05) decreases in sildenafil citrate (positive control), extract 200 and 400mg/ kg b. wt treated groups compared to normal control. Ejaculation latency significantly (P<0.05) increases in sildenafil citrate (positive control), extract 100, 200 and 400mg/kg b. wt treated groups compared to normal control.

Week 0 (Prior Extract Administration)						
Groups	Mount latency (min)	Mount frequency	Intromission latency (min)	Intromission frequency	Ejaculation latency (s)	Post ejaculation interval (min)
Normal control	32.58±0.67^{b}	7.33±0.33^{a}	28.69±3.44^{a}	1.33±0.33^{a}	6.3±0.33^{a}	55.68±4.32^{a}
Positive control	32.13±4.73^{b}	7.67±0.88^{a}	32.64±7.55^{a}	1.00±0.00^{a}	6.0±0.06^{a}	60.00±0.00^{a}
Extract 100mg/kg	27.96±1.50^{ab}	7.33±0.33^{a}	32.52±2.96^{a}	1.00±0.00^{a}	6.3±0.03^{a}	60.00±0.00^{a}
Extract 200mg/kg	29.20±2.17^{ab}	7.67±0.67^{a}	26.53±2.84^{a}	1.33±0.33^{a}	5.7±0.07^{a}	60.00±0.00^{a}
Extract 400mg/kg	22.40±0.55+	6.33±0.33^{a}	31.91±3.38^{a}	1.00±0.00^{a}	6.3±0.03^{a}	60.00±0.00^{a}
Week 1						
Groups	Mount latency	Mount frequency	Intromission latency	Intromission frequency	Ejaculation latency (s)	Post ejaculation interval (min)
Normal control	10.91±0.83^{b}	5.67±0.67^{bc}	12.08±0.58^{c}	1.33±0.33^{ab}	6.67±0.88^{a}	59.13±0.87^{c}
Positive control	0.93±0.22^{a}	2.00±0.58^{a}	2.54±0.30^{a}	2.33±0.33^{b}	16.67±2.73^{c}	17.79±1.42^{a}
Extract 100mg/kg	9.51±1.43^{b}	7.00±1.00^{c}	10.71±1.34^{c}	1.00±0.00^{a}	10.33±1.45^{ab}	60.00±0.00^{c}
Extract 200mg/kg	2.24±0.54^{a}	2.67±0.88^{a}	5.54±0.30^{b}	1.67±0.33^{ab}	13.33±0.88^{bc}	48.45±5.93^{b}
Extract 400mg/kg	1.32±0.50^{a}	3.33±1.20^{ab}	2.57±0.76^{a}	2.33±0.33^{b}	14.33±0.33^{bc}	23.07±4.36^{a}
Week 2						
Groups	Mount latency	Mount frequency	Intromission latency	Intromission frequency	Ejaculation latency (s)	Post ejaculation interval (min)
Normal control	9.32±0.63^{b}	5.33±0.33^{a}	12.69±0.40^{c}	1.00±0.00^{a}	6.33±0.33^{a}	60.00±0.00^{b}
Positive control	0.62±0.21^{a}	3.00±1 .00^{a}	2.28±0.53^{a}	2.33±0.33^{b}	19.33±1.33^{d}	16.44±1.81^{a}
Extract 100mg/kg	11.11±0.00^{b}	4.33±1.20^{a}	6.32±0.58^{b}	1.00±0.00^{a}	9.33±0.33^{b}	60.00±0.00^{b}
Extract 200mg/kg	2.09±1.11^{a}	3.33±0.33^{a}	3.93±1.30^{a}	1.33±0.33^{ab}	10.67±0.33^{b}	47.69±12.31^{b}
Extract 400mg/kg	1.32±0.67^{a}	3.33±1.33^{a}	2.66±0.59^{a}	2.00±0.58^{ab}	15.67±0.33^{c}	32.11±14.05^{ab}

Table 2: Aphrodisiac Potential of Securidaca longipedunculata Stembark Methanol Extract on Male Albino Rats

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Values are presented as mean ± SEM (n = 3)
Values with different superscript along the columns were statistically significantly different at P<0.05
S=seconds

3.3. Effect of *Securidaca longipedunculata* Stembark Methanol Extract on Mating Performance of Male Albino Rats

The effect of *Securidaca longipedunculata* stembark methanol extract on mating performance of male albino rats is presented in Table 3. A significant (P<0.05) increases in mating performance was observed only in groups treated with sildenafil citrate (positive control) and extract 400mg/kg b. wt compared to normal control.

Groups	Mating Performance (%)
Normal control	22.22±1.22a
Positive control	88.89±11.11c
Extract 100mg/kg	27.04±3.17a
Extract 200mg/kg	29.63±3.70a
Extract 400mg/kg	55.55±11.11b

Table 3: Effect of *Securidaca longipedunculata* Stembark Methanol Extract on Mating Performance of Male Albino Rats

Values are presented as mean ± SEM (n = 3)
Values with different superscript along the columns were statistically significantly different at P<0.05

4. Discussion

Phytochemicals; bioactive secondary components that are present plants naturally and their availability and secretions differ from plant to plant. Apart from aiding plant defence mechanism these secondary metabolites also have several medicinal applications. According to numerous phytochemicals including flavonoids phenolic compounds, terpenoids, and alkaloids are associated with plant aphrodisiac activity. In the present study *Securidaca longipedunculata* stembark methanol extract showed the presence of saponins, flavonoids, alkaloids and phenols this study agree with the findings of who also reported the presence of the aforementioned phytochemicals in *Securidaca longipedunculata* stembark methanol extract [15,16]. Aphrodisiac activity refers to the capacity of substances, often natural or synthetic, to enhance sexual performance desire and arousal. To determine aphrodisiac potential parameters such as, (mount latency and frequency), (intromission latency and frequency), ejaculatory latency, and post-ejaculatory were employed. In the presence study, the decrease in mount latency, mount frequency and post ejaculation interval means that the animal is more readily initiating mounting behaviour and engaging in sexual activity more frequently suggesting enhanced sexual response [17]. Meanwhile an increase in intromission latency, intromission frequency, ejaculatory latency, and post-ejaculatory observed in this study. According to Prochowska and Niżański (2022) increases in intromission latency suggests an increased drive to copulate and/or difficulty in achieving intromission, potentially requiring multiple attempts, while, increase in ejaculation latency may indicate delayed ejaculation, potentially due to factors like reduced sensitivity or impaired neural pathways [18,19].

5. Conclusion

S. longipedunculata stembark methanol extract demonstrated significant aphrodisiac activity via decreases in mount latency, mount frequency and post ejaculation interval, and also an increase in intromission frequency, intromission latency, ejaculatory latency, and post-ejaculatory interval likely mediated by its bioactive constituents. Hence, these findings validate the traditional use of *S. longipedunculata* stembark as a sexual enhancer and warrant further investigation into its mechanisms of action.

Declaration of interest

Authors declared no conflict of interest.

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