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THE SENSITIVE PLANT *MIMOSA PUDICA*: ASPIRATION OF SEXUAL MOTIVATION

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ABSTRACT

Background: Herbal medicines are known to be the most potent aphrodisiac activity with the lowest possible side effects. Thus, it is aiming to evaluate aphrodisiac activity of extracts of roots of Mimosa pudica in male albino rats.

Materials and Methods: Chloroform, alcoholic and aqueous extracts of roots of Mimosa pudica at a dose of 200 mg/kg and 400 mg/kg were administered in the male albino rats after sexual experiences for seven days. Hormonal therapy was used to make the female rats in the mating course friendly. General mating in behavior and libido were studied. Data were analyzed statistically by the method of One way ANOVA in GraphPad software and values were expressed as Mean ± standard deviation.

Results: Oral administration of solvent extracts at dosages of 200 mg/kg and 400 mg/kg substantially enhanced increase in the mounting frequency, intromission frequency and ejaculation latency, while decrease in the mounting latency, intromission latency and post-ejaculatory interval. It is also improved libido to the rats.

Conclusion: The alcoholic extract of roots of Mimusa pudica has the capacity to build aphrodisiac activity in male albino rats. Thus Mimusa pudica will be clinically helpful as sexual invigorator in males.

Keywords: Herbal medicine, *Mimosa pudica*, Aphrodisiac, Male sexual behavior

INTRODUCTION

An aphrodisiac is a material that increments sexual want, sexual delight, or sexual conduct **[1-3]**. Substances range from an assortment of plants, spices, food and synthetic compounds. In this way, they can be classified by their chemical properties (i.e., substances that are natural and unnatural) **[4]**. Natural aphrodisiacs like alcohol are additionally grouped into plant-based and non-plant-based substances **[5]**. Unnatural aphrodisiacs are those that are manufactured to impersonate a characteristic substance. Similarly, aphrodisiacs can be arranged by their manner of impacts like psychologically or physiologically. Aphrodisiacs that contain psychedelic properties like Bufo frog effect-sly affect an individual that can increment sexual want and sexual desire **[3]**. Aphrodisiacs that contain smooth muscle loosening up properties like yohimbine effect-sly affect an individual that can influence hormone levels and increment blood stream **[4]**. Male sexual behavior is an unpredictable procedure facilitated and kept up by inside and outside signs **[6]**. It incorporates precopulatory and copulatory practices that grant males to recognize and find females for the evaluation of their mating behavior. Different synthetic substances, for example, dopamine, amyl nitrite, and sildenafil citrate, generally used to improve sexual urge and execution are related with symptoms **[7]**. In creating countries, the quest for new compounds from medicinal plants is being strengthened, likely due to low reactions, simple accessibility, ease, and high adequacy. For example, *Dracaena arborea* **[8]**, *Guibourtia tessmannii* **[9]**, *Ficus asperifolia* **[10]**, *Montanoa tomentosa* **[11]**, *Kaempferia parviflora* **[12]** and *Boesenbergia rotunda* **[13]** are accounted for to have prosexual properties in male rats.

Mimusa pudica Linn. (Mimosae), delicate plant in English and Lajvanti or Chuimui in Hindi. is distributed throughout India mainly in the drizzling areas. It is a thorny shrub, around of 45 - 90 cm in height. Leaves are bi-pinnately, compound, pinnate 2-4, gently organized with 10-20 sets of leaflets, rachis dressed with rising fibers. Blossoms pink, with globose heads, peduncles thorny, ordinarily in auxiliary pairs all along the branches. The roots and leaves of the plant commonly used as astringent, cooling vulnerary agent, alexipharmic agent, diuretic agent, antispasmodic agent, emetic and febrifuge. They are also utilized for leucoderma, vaginopathy, metropathy, ulcers, looseness of the bowels, irritations, consuming sensation, hemorrhoids, jaundice, asthma, fistula, little pox, fitful, expressions of love and fevers **[14]**. Hydrocele, haemorrhoids, fistula, scrofula, conjunctivitis, cuts, wounds, and haemorrhages benefits are found from the bitter, sudorific, and tonic properties of the leaves. The entire plant is utilized for vesicle calculi and remotely for odema, ailment,

myalgia and tumors of the uterus **[15]**. Literatures study on *Mimusa pudica* Linn. (Mimosae) propose different helpful utilization of plant, for example, ovulation **[16]**, vibriocidal **[17]**, energizer **[18]**, estrogenic activities **[19]**, anti-implantation action **[20]**, hyperglycemic **[21]**, anticonvulsant property **[22]**, hyaluronidase and protease activities **[23]**. The bimolecule isolated from *Mimosa pudica* are tubulin, confinement of C-glycosylflavones, phenolic ketone, a novel buffadienolide, fragrant amino acids and concoction constituents of C-glycosylflavones **[24]**.

MATERIALS AND METHOD

Plant material and extraction: The roots of *Mimusa pudica* Linn. (Mimosae) were collected from Guwahati, Assam and confirmed by the Botanical Survey of India (BSI), Shillong, Meghalaya. The powder of dried roots was exposed to ceaseless soxhlet extraction with different solvents (petrolium ether, chloroform, ethanol and water) in the order of increasing polarity. Each extracts were then concentrated, dried and kept in vacuum desiccators for further processes.

Phytochemical Screening: The presence of different phyto-constituents in the extracts of root of *Mimosa pudica* was dictated by the fundamental phytochemical screening according to standard methods **[25]**.

Ethical consideration: The project was presented and validated by the Internal animal ethics committee of Faculty of Pharmaceutical Science, Assam down town University was acquired by meeting on date 23/12/2015, Ref No ADTU/IAEC/2015/001 which follows the internationally accepted standard ethical laboratory animal guidelines utilization and precaution as described in the European Economic community guidelines; EEC Directive 86/609/EEC, of the 24th November 1986 **[26]**.

Acute Toxicity Study: Clinical toxicity signs, for example, respiratory pain, salivation, weight reduction and change in appearance of hair just as maternal mortality was not seen at any time of the analysis. Correspondingly no mortality and changes in the behavioral, neurological and autonomic silhouette were seen in treated gatherings of the rats up to most noteworthy dose of 4000 mg/kg body weight. Subsequently, one tenth (1/10) of treated dose was chosen for current examination **[27]**.

Mating Behavior Test: Male albino rats (200-300 gm) with vigorous sexual actions were chosen for this study because all the rats were fit and sexually practiced. During the experiment, male rats were separated into five groups having six rats each and maintained in different cages **[28]**.

Group 1: Negative control- Distilled water (10 ml/kg).

Groups 2-4: Experimental- Suspension of aqueous, alcohol and Chloroform extract of *Mimosa pudica* (200 mg/kg and 400 mg/kg) respectively.

Group 5: Positive control- Sildenafil citrate.

Because the male albino rats should not be examined in unskilled conditions, they were then transported to the laboratory and kept to dim light at the time of analysis for six days prior to the experimentation. The female rats were artificially took into estrus (heat) 17 as per the Ajayi et.al method, while female rats only permit mating throughout the estrus period **[29]**. They were then administered with a suspension of ethinyl oestradiol through oral route at a dose of 4.5 mg/rat 48 hours prior to the coupling, as well as progesterone also injected through subcutaneous route at a dose of 1 mg/rat six hours prior to the coupling. Male rats were differentiated as the control, experimental, and standard to check the female rats receptivity before the experiment. The study only included the most responsive females. The experimentation was conducted out on the seventh day after the male rats treatment began. The experimentation was performed at 20:00 hours in the same workroom and with the same intensity of light. The responsive female rats were placed in male rats cages at a ratio of one female and male rat. The monitoring of mating behaviour began right away and was continued for the first 2 mating sequence. If the male failed to show sexual desire, the test was stopped. While, if the female rats did not exhibit signs of receptivity, it was replaced by an another artificially warmed female rat. The observations were immediately captured on audio-video tape. It was also noted that they had vanished. Later, cassette transcriptions were used to estimate the frequencies and phases like Mounting Frequency (MF), Intromission Frequency (IF), Mounting Latency (ML), Intromission Latency (IL), Ejaculatory Latency (EL) and Post-ejaculatory Interval (PEI) **[30, 31]**.

Test for Libido: The study used (200-300)g of coupling male albino rats which were displaying rapid coupling movement. During the trial, the male rats were separated into five groups of six rats each and housed in different cages **[28]**.

Group 1: Negative control- Distilled water (10 ml/kg).

Groups 2-4: Experimental- Suspension of aqueous, alcohol and Chloroform extract of *Mimosa pudica* (200 mg/kg and 400 mg/kg) respectively.

Group 5: Positive control- Sildenafil citrate.

Because the male rats should not be examined in new situations, they were then transported to the laboratory and kept to dim light at the time of analysis for six days prior to the experimentation. Female rats were given hormonal therapy to make them receptive, and all of the rats were acclimated to the experimental procedures as described in the mating behaviour test. On the evening of the seventh day at 20:00 hours, the rats were monitored for Mounting Frequency (MF). By withdrawing the sheath, the penis was exposed, and 5 percent xylocaine ointment

was administered 30, 15, and 5 minutes before commencing observations. Each rat was housed in its own cage, with the receptive female rat in the same enclosure. The total number of mountings was calculated. Intromission and ejaculation were also monitored in the rats **[30, 31]**.

RESULTS

Phytochemical Screening: The preliminary phytoconstituents investigations of *Mimusa pudica* extracts reflects the occurrence of alkaloids, glycosides, carbohydrates, flavonoids, steroids, tannins and phenolic compounds. Identification of various phyto-constituents by chromatographic techniques shows the presence of alkaloids in chloroform extract and flavonoids in alcoholic as well as aqueous extracts **(Table 1)**.

Effect of drug on mating behavior: By comparing to the starting value (i.e. before treatment at day 0) in all groups, the ML was decreased in rats given sildenafil citrate. Rats administered with alcoholic and aqueous extracts of *Mimusa pudica* (400 mg/kg) the ML was lowered by 80% and 69% respectively, compared to the base line. The IL was significantly lowered in rats administered with sildenafil citrate and *Mimusa pudica* extracs (400 mg/kg) on day 7 **(Table 2 and Table 3)**. While, sildenafil citrate extensively increased in the MF after 7 days of treatment. Similarly, alcoholic extract (400 mg/kg) of *Mimusa pudica* enhanced the appreciably increasing sexual performance after seven days of treatment. A tendency in increase (1.63 ± 0.321) of the IF was observed with the alcoholic extract of *Mimusa pudica* (400 mg/kg) for seven days. Overall, *Mimusa pudica* was more successful in enhancing mount and intromission rates after 7 days of therapy, whereas sildenafil citrate had the greatest impact after more than 7 days of treatment **(Table 2 and Table 3)**.

Effects of drug on libido: The aqueous, alcoholic and chloroform extract of *Mimusa pudica* at the dose of 200 and 400 mg/kg increased the MF ($P<0.001$, $P<0.01$ and $P<0.05$, respectively). The intromission was seen in all the groups except in the aqueous extract treated group. The ejaculation was occurred only in the standard group and alcoholic extract treated groups at the dose of 200 and 400 mg/kg body weight. However, a remarkable improved libido activity was noted in standard drug and alcoholic extract treated groups **(Table 4)**.

Table 1: Phyto chemical screening of *Mimusa pudica* Linn roots by thin layer chromatography method

Solvent system	Detection Reagent	Observation	Inference	Chloroform extract	Ethanol extract	Aqueous extract
Ethyl acetate : Methanol : Water (75 : 13.5 : 10.5)	KOH	Yellow	Anthraquinone Anthrone	-	-	-
	Dragen dorffs reagent	Orange Red	Alkaloid	+	-	-
	NP/PEG & UV	Yellow/green/orange	Flavonoid	-	+	+
	VS reagent	Blue	Saponin	-	-	-
Toluene :ethyl acetate (95 : 5)	VS reagent	Red/yellow/brown /blue- green	Essential oil	-	-	-
	NH_3 / KOH	Light Blue brown	Coumarin	-	-	-

Table 2: Mating behavior effect of *Mimosa pudica*

Treatment groups	Parameters						
	Doses (mg/kg Body wt)	Mounting Frequency (MF)	Intromission Frequency (IF)	Mounting Latency (in S)	Intromission Latency (in S)	Ejaculation Latency (in S)	Post-Ejaculatory Interval (PEI) (in S)
Control	Vehicle	3.56 ± 0.342	0.15 ± 0.154	252.19 ± 7.391	598 ± 0.122	110.6 ± 3.65	150.00 ± 1.06
Aqueous extract	200	2.54 ± 0.234^{ns}	0.55 ± 0.712^{ns}	188.21 ± 4.66***	310.31 ± 2.401***	87 ± 2.65***	148.67 ± 0.99^{ns}
	400	4.13 ± 0.521^{ns}	1.23 ± 0.360^{ns}	175.54 ± 3.234***	286.54 ± 1.362***	95 ± 2.42***	146.24 ± 0.89***
Alcoholic extract	200	3.62 ± 0.386^{ns}	0.67 ± 0.555^{ns}	220.30 ± 5.023***	367.75 ± 3.542***	107 ± 2.63^{ns}	135.12 ± 0.72***
	400	5.66 ± 0.494*	1.63 ± 0.321^{ns}	204.16 ± 5.231***	350.10 ± 6.733***	113 ± 2.32^{ns}	168.44 ± 1.99***
Chloroform extract	200	2.89 ± 0.310^{ns}	0.59 ± 0.652^{ns}	212.43 ± 3.87***	323.34 ± 3.423***	119 ± 1.65***	130.20 ± 0.012***
	400	4.90 ± 0.541^{ns}	1.37 ± 0.431^{ns}	198.23 ± 2.43***	321.12 ± 5.321***	124.3 ± 3.45***	112.41 ± 1.56***
Sildenafil citrate	5	15.07 ± 3.540***	2.28 ± 0.341^{ns}	7.90 ± 0.239***	182.22 ± 5.321***	180.2 ± 3.12***	182.12 ± 2.07***

Data are means ± SD, n = 6. $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$ and ^{ns}not significant

Table 3: Mating behavior effect of *Mimosa pudica* after 7 days

Treatment groups	Parameters						
	Doses (mg/kg Body wt)	Mounting Frequency (MF)	Intromission Frequency (IF)	Mounting Latency (in S)	Intromission Latency (in S)	Ejaculation Latency (in S)	(PEI) (in S)
Control	Vehicle	3.34 ± 0.564	0.14 ± 0.134	221.67 ± 5.532***	562.00 ± 0.054***	99.39 ± 2.05***	165.34 ± 1.45***
Aqueous extract	200	2.14 ± 0.546^{ns}	1.02 ± 0.324^{ns}	159.24 ± 5.231***	245.23 ± 3.546***	76.23 ± 1.76***	108.54 ± 1.22***
	400	5.67 ± 0.668***	2.46 ± 0.452***	137.54 ± 4.471***	186.12 ± 5.620***	84.45 ± 2.23***	204.76 ± 0.87***
Alcoholic extract	200	3.20 ± 0.563^{ns}	1.45 ± 0.478**	181.30 ± 6.100***	263.12 ± 5.543***	92.43 ± 2.63***	189.43 ± 0.44***
	400	8.67 ± 0.772***	3.66 ± 0.576***	150.22 ± 5.781***	221.56 ± 7.321***	102.61 ± 2.12^{ns}	175.84 ± 0.67***
Chloroform extract	200	7.51 ± 1.20***	10.66 ± 0.88***	162.43 ± 1.431***	123.40 ± 10.231***	108.12 ± 1.70***	201.51 ± 0.237***
	400	9.65 ± 0.66***	12.5 ± 0.76***	137.79 ± 4.342***	112.81 ± 2.034***	113.47 ± 1.33***	190.60 ± 1.87***
Sildenafil citrate	5	15.00 ± 1.834***	6.49 ± 0.632***	109.67 ± 5.044***	122.38 ± 1.768***	199.32 ± 2.51***	199.65 ± 2.98***

Data are means ± SD, n = 6. $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$ and ^{ns}not significant

Table 4: Mounting frequency (libido) effect of extracts of *Mimosa pudica*.

Treatment groups	Parameters			
	Doses (mg/kg Body wt)	Mount Frequency (MF)	Intromission Frequency (IF)	Ejaculation (EJ)
Control	Vehicle	4.8 ± 0.47	4 ± 0.36	Absent
Aqueous extract	200	7.83 ± 0.47***	Nil***	Absent
	400	8.11 ± 0.50***	Nil***	Absent
Alcoholic extract	200	12.16 ± 0.60***	9 ± 0.36***	Present
	400	13.33 ± 0.80***	11 ± 0.44***	Present
Chloroform extract	200	13.48 ± 0.48***	3.5 ± 0.42ns	Absent
	400	17.66 ± 0.42***	4.66 ± 0.33*	Absent
Sildenafil citrate	5	17.83 ± 0.70***	9.5 ± 0.56***	Present

Data are means ± SD, n = 6. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$ and nsnot significant

DISCUSSIONS

Phytoconstituents investigation can assist in determining the active chemical compositions of the extract of plant material. It is also utilized to find chemical compounds that can be employed as starting materials in the partial synthesis of certain effective medicines. The preliminary phytoconstituent investigation of the plant extracts of *Mimusa pudica* showed the occurance of alkaloids, glycosides, carbohydrates, flavonoids, steroids, tannins and phenolic compounds. The steroids and saponins from plant materials are found to possess potent fertility actions and also utilized for the treatment of impotence.

In the present study, chloroform, alcoholic and watery extracts of *Mimusa pudica* Linn. were used to study the effects of the plant on sexual behavior, with sildenafil citrate serving as a positive control. The alcoholic extract of *Mimusa pudica* has significant sexual function enhancing activity compared to the other extracts. When compared to the control medication, the test drug considerably enhanced the MF and IF, but not as much as the standard drug. The libido indices MF and IF are used to measure libido. Treatment with all the extracts of *Mimusa pudica* Linn. plant at different doses the behavior of treated animals was significantly changed, with females being more attracted to them. An increase in PEI was found in alcoholic extract of *Mimosa pudica* ($P<0.01$) as compared to control group. The MF, IF and PEI were expressively reduced in the drug treated groups. ML which is known as an indicator of physical tiredness during a sexual act was reduced in *Mimusa pudica* treated groups as compared to control group. Similarly, the IL and PEI time was reduced of *Mimusa pudica* Linn. treated group ($P<0.05$). Reduced IL and PEI have been correlated with invigoration of endocrine system, resulting in enhanced sexual performance and motivation.

CONCLUSION

From the above study it can be concluded that the alcoholic extract of roots of *Mimusa pudica* has the capacity to build aphrodisiac activity in ordinary male albino rats especially remarkable action in 400 mg/kg dose with no

gastric ulceration and unfriendly impacts and gave logical proof for the cases made in ayurvedic medication that the extract of roots of *Mimusa pudica* is clinically helpful as sexual invigorator in males.

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CONFLICT OF INTEREST

The authors have no conflict of interest for publication of this paper.

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