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## Aphrodisiac property of aerial parts of *Trianthema decandra* Linn.

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### ABSTRACT

Aim of the study is to identify and evaluate the active constituents present in the aerial parts of *Trianthema decandra* Linn. The fresh aerial parts of plant were collected, dried under shade, coarsely powdered and successively extracted with different solvents based on increasing order of polarity. All the extracts of the plant were subjected for phytochemical screening. The methanol extract was screened for aphrodisiac activity.

The sexual activity of male mice in Assessment of mating model was determined by administering methanolic extract of *Trianthema decandra* of different doses and each male mouse was placed in separate cage. After one hour, five oestrous females were placed into each cage and cohabitated overnight. The vaginal smear of each female mouse was examined next day under the microscope to confirm mating by the presence of sperms. To study the Effect on fertility in mice model, different groups of animals (mice) were treated as above and each male mouse was placed in separate cage. After one hour, one oestrous female with proven fertility was admitted into each cage and cohabitated overnight. These females were watched for pregnancy and birth of offspring's.

In the conclusion, out of all test extract doses of *Trianthema decandra*, medium and high dose showed significant aphrodisiac activity when compared with control and standard groups. Hence this reveals that *Trianthema decandra* have fertility enhancing activity. Further research is needed to identify biologically active constituents for fertility enhancing activity.

**Keywords:** Assessment of mating in mice, Effect on fertility in mice, *Trianthema decandra*.

### INTRODUCTION

*Trianthema decandra* Linn. belongs to family Aizoaceae, commonly known as "Punarnavi" in Sanskrit, "Gadabandi" in Hindi, "Vellaisharuni" in Tamil and "Gajjasoppu" in kannada. More than 20 species of *Trianthema* have traditional medical importance are reported. One among them is *Trianthema decandra* Linn. is a prostrate fleshy herb. Leaves are unequal, up to 3.5 x 1.5 cm, elliptic, oblong or ovate, tip pointed, base wedge-shaped, stalk up to 1cm and sheathing at base. Flowers are borne in leaf axils, solitary or in clusters. Bracts are membranous, bracteoles 1.5 mm. sepal cup is 2mm, sepals 3mm, ovate, mucronate, on the back. Petals are absent, stamens 15, filaments 4 mm, anthers oblong, ovary 2mm, oblong, 1-ovuled, styles 2. Capsule is 5mm, flat at the tip. *Trianthema decandra* is found in India, Srilanka, Myanmar, Indonesia<sup>[1, 2]</sup>.

In the traditional Indian system of medicine, the ayurveda and various folk system of medicine, *Trianthema decandra* possess several medicinal properties such as tooth ache, analgesic, anti-inflammatory, anti-diabetic and other skin disorders, etc.,<sup>[3]</sup>. Phytochemical studies have shown that, presence of Carbohydrates, Alkaloids, Steroids, Tannins, Fats, Oils and Saponins<sup>[4]</sup>.

Medicinally *Trianthema* in general is not subjected to detailed pharmacological study. Scientific studies on medicinal *Trianthema* can lead to the development of invaluable drugs to certain medical conditions. *Trianthema decandra* has not been evaluated in depth for its pharmacological properties, in spite of its traditional use in numerous medical conditions. Only the anti-inflammatory, analgesic and anti-diabetic activity of this plant has been evaluated<sup>[5, 6, 7]</sup>.

An aphrodisiac is defined as an agent that arouses sexual desire. Many natural substances have historically been known as aphrodisiac<sup>[8]</sup>.

Sexual dysfunction is a repeated inability to achieve normal sexual intercourse, which includes various forms like premature ejaculation, retarded ejaculation, erectile dysfunction, arousal difficulties, etc.

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Several management options employed are associated with some serious side effects and are not readily available and expensive. The search for natural supplement from medicinal plants is being intensified, probably because of reduced side effect, its ready availability and reduced cost. Therefore, the increasing use for search and screening of medicinal plants with aphrodisiac potential in male has been necessitated<sup>[9]</sup>.

Erectile dysfunction (ED) is considered as one of the most important public health problem, since it affects higher percentage of men. Although there are number of conventional medical treatments are available now a days, but plant-derived and herbal remedies serve to provide as an alternative for men seeking to improve their sexual life. In most of the cases it is observed that increase in the testosterone levels enhance the sexual behavior in humans. Moreover, drugs inducing changes in neurotransmitter levels or their action at the cellular level could also change the sexual behavior. Extensive research has been going on to search a better aphrodisiac agent, by which one can treat such class of complications<sup>[10]</sup>.

The discovery of therapeutic agents is mainly relying on chemical constituent of plants and in discovering the actual value of folklore remedies. The phytoconstituents present in medicinal plants provide definite physiological action on the human body and these bioactive substances includes tannins, alkaloids, carbohydrates, triterpenoids, steroids and flavonoids<sup>[11]</sup>. These compounds are synthesized by primary or rather secondary metabolism of living organism. The medicinal use of plants is an ancient tradition, far older than the contemporary sciences of medicine, pharmacology and chemistry. Now a day's medicinal plants are widely used in the human therapy, veterinary, agriculture, scientific research and countless other areas<sup>[12]</sup>. It was also found that there are a number of phytochemicals belonging to various chemical classes have been shown to have inhibitory effects on all types of microorganisms<sup>[13]</sup>. Plant products have been part of phytomedicine since time immemorial. This can be derived from plant leaves, flowers, roots, fruits and seeds, etc<sup>[14]</sup>.

Hence an attempt to evaluate the aerial parts of *Trianthema decandra* for its influence on copulatory behavior, sperm count and litter size, male and female ratio in the Swiss mice is being considered as worthwhile investigative.

## MATERIALS AND METHODS

### Plant material

The fresh aerial parts of *Trianthema decandra* were collected and authenticated by Dr. K.MadhavaShatty, Assitant Professor, Dept. of Botany, S.V. University, Tirupathi, A.P. The plant herbarium was prepared (PRIP-01/13) and deposited in the Dept. of Pharmacognosy, Pulla Reddy Institute of Pharmacy for further reference.

### Preparation of Extract

The whole plant was dried at room temperature under shade and coarsely powdered. The powdered material was subjected to hot extraction process using soxhlet apparatus by successive solvent

extraction method based on the increasing order of solvent polarity and solvent was removed by Buchi 461 Rotary vacuum evaporator<sup>[15]</sup>. The methanolic extract was then used for studying bio-activity.

### Animals

Healthy Swiss albino mice (20-25g) were used. They were fed with standard rodent pellet and water ad libitum and maintained under standard environmental condition for 7 days before the experiment for acute oral toxicity studies and investigation of Aphrodisiac property of methanolic extract. The animal studies were performed as per rules and regulations in accordance to guidelines of CPCSEA with registration number 51/01/C/CPCSEA.

### Acute Toxicity<sup>[16-17]</sup>

To determine acute toxicity, if any, dose up to 2g/kg (p.o.) of the methanolic extract suspended in gum acacia given to 5 group each containing 6 mice. The control mice received gum acacia in an identical manner. The mice were observed continuously for 1hr for any gross behavioral changes and deaths, if any, and intermittently for the next 6 hrs and then again at 24 hrs after dosing. The behavioral parameters observed were convulsion, hyperactivity, sedation, grooming, loss of righting reflex and increased respiration.

### Assessment of Mating in mice<sup>[18, 19]</sup>

To assess the mating in mice the adult Swiss albino male mice of (25-35g) were placed in separate cage. Five oestrous females were placed into each cage and cohabitated overnight. The vaginal smear of each female mouse was examined on next day under microscope to confirm the mating by the presence of sperms.

To determine the effect of methanolic extract of aerial parts of *Trianthema decandra* on assessment of mating, 5 groups were taken and each group contained 6 animals. Different groups of animals (mice) were treated with vehicle/standar/test drug in the evening (17.00 to 18.00).The methanolic extract was suspended in Gum Acacia. The first group received 1.0% gum acacia and served as control. Group 2 received 100mg/kg of Tensex forte as a standard, groups 3, 4 and 5 were given 100mg/kg, 200mg/kg and 400mg/kg methanolic extract respectively.

In assessment of mating model, the animals were cohabitated overnight with five females and increase in the number of sperm + ve females were considered as a positive signs for aphrodisiac activity.

### Effect on Fertility in Mice<sup>[20, 21]</sup>

To determine the effect of methanolic extract of aerial parts of *Trianthema decandra* on effect of fertility in mice. Adult swiss albino male mice of (25-35g) each group consisting of 6 animals was divided in to five groups. The first group received 1.0% gum acacia and served as control, group 2 received 100mg/kg of Tensex forte as a standard, groups 3, 4 and 5 were given 100mg/kg, 200mg/kg and 400mg/kg methanolic extract respectively in the evening (17.00 to

18.00) and each male mouse was placed in separate cage. After one hr, one oestrous female with proven fertility was admitted into each cage and cohabitated overnight. These females were watched for pregnancy and birth of offsprings. The litter size and number of male and female pups were recorded in each group.

**Statistical Analysis**<sup>[22]</sup>

All data, except for body weight and fertility test, were analysed by one-way analysis of variance (ANOVA) followed by Newman-Keuls' multiple range test for the comparison of group means. Body weight data were analysed by the Student's t test. Data on male fertility and pregnancy in the females were analysed by the Chi-square test. Student's t test was used to analyse data on litter size. Values were considered significant at P<0.05 & P<0.01.

**RESULTS**

**Preliminary Phytochemical screening**

The crude extracts obtained from the pilot scale extraction were subjected to preliminary Phytochemical screening. Carbohydrates, alkaloids, phytosterols, terpenoids, saponins, flavonoids, tannins & phenolic compounds were reported in the methanolic extract.

The acute toxicity was determined by giving the dose up to 2g/kg (p.o.) of the methanolic extract to mice. The control mice received gum acacia in an identical manner. The mice behavioral changes like convulsion, hyperactivity, sedation, grooming, loss of righting reflex and increased respiration were observed continuously for 6 hrs after dosing. The mice shows no changes in behavioral parameters and drug was concluded as safe.

**Effect of *Trianthema decandra* on Assessment of Mating in mice:**

When compared to control an increase in number of sperm + ve females were recorded with methanolic extract of *Trianthema decandra* treated groups. Standard drug (Tentex forte 100mg/kg) and methanolic extract treated groups with different dose levels i.e. 100, 200 and 400 mg/kg have shown a significant increase in the number of sperm + ve females. (Table1 and Fig. 1)

**Table 2:**Effect of AETD on Litter size and M/F ratio in mice (Fertility model)

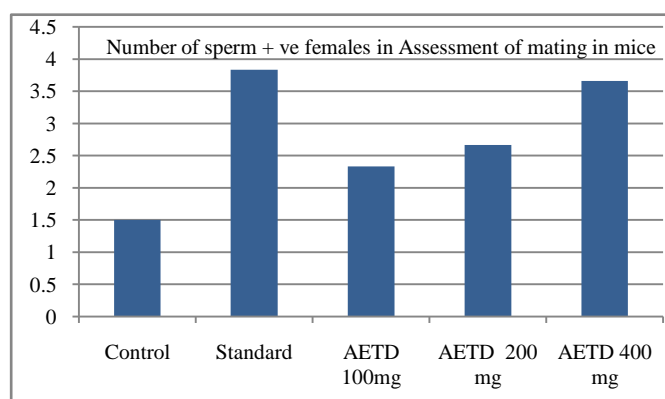
S.NO	GROUP	DOSE (mg/kg)	MEAN ± SEM	
			LITTER SIZE	M/F RATIO
1	CONTROL	10ml	4.500 ± 1.455	0.7350 ± 0.263
2	STANDARD	100	11.333**±0.3333	0.8024 ± 0.137
3	LOW DOSE AETD	100	6.667 <sup>NS</sup> ± 1.358	0.8983± 0.236
4	MEDIUM DOSE AETD	200	9.167** ± 0.3073	0.8160 ±0.1221
5	HIGH DOSE SETD	400	10.167** ±0.3073	0.8108 ± 0.153
ONE WAY ANOVA		F	8.954	1.374
		df	29	29

n=6 in each group Significance at \*p<0.05, \*\* p<0.01 & ns-not significant vs control

**Table 1:** Effect of AETD on number of sperm + ve females in Assessment of Mating in mice.

S.NO	GROUP	DOSE (mg/kg)	MEAN ± SEM	
1	NORMAL CONTROL	10ml	1.500 ± 0.2236	
2	STANDARD	100	3.833**± 0.1667	
3	LOW DOSE AETD	100	2.333* ± 0.2108	
4	MEDIUM DOSE AETD	200	2.667** ± 0.2108	
5	HIGH DOSE SETD	400	3.667** ± 0.2108	
			F	22.171
One way ANOVA			df	29

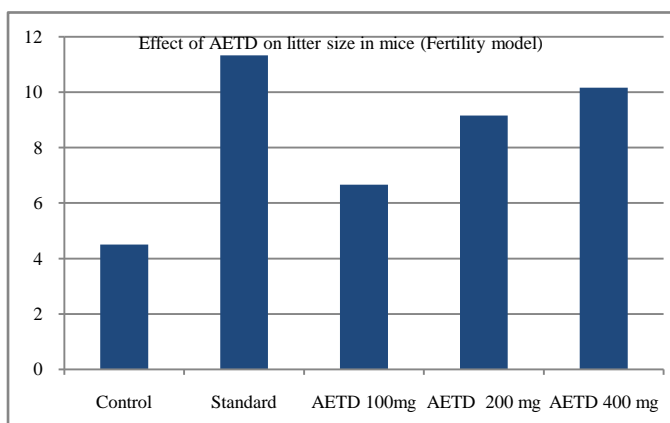
n=6 in each group Significance at \*p<0.05, \*\* p<0.01 & ns-not significant vs control.



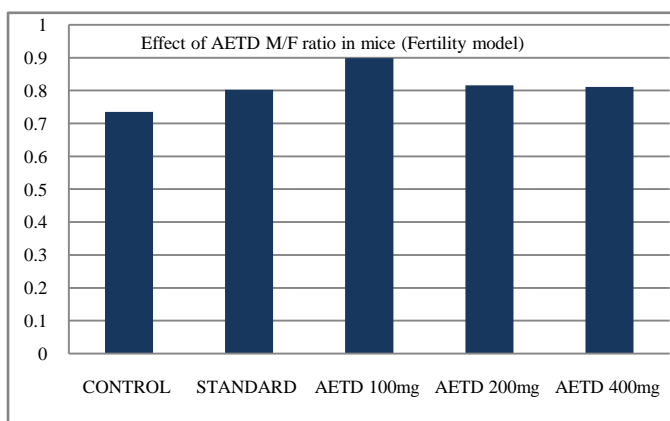
**Figure 1:** Effect of AETD on number of sperm + ve females in Assessment of mating in mice

**Effect on fertility in mice**

Tentex forte and methanolic extract of *Trianthema decandra* (200 and 400mg/kg) treated groups have shown an increase in the litter size but when compared to control group. Methanolic extract of *Trianthema decandra* 100 mg/kg treated group have not shown a significant increase in the litter size (Table 2 and Fig.2). Tentex forte (100mg/kg) and methanolic extract of *Trianthema decandra* (100, 200 and 400mg/kg) treated groups have not shown a significant increase in m/f ratio when compared to control group (Table 2 and Fig. 3).



**Figure 2:** Effect of AETD on Litter size in mice (Fertility model)



**Figure 3:** Effect of AETD on M/F ratio in mice (Fertility model).



**Figure 4:** Male mice showing Mounting behavior

## DISCUSSION

*Trianthena decandra* is unique in providing numerous pharmacological activities. It has been used whole range of chronic diseases such as cancer, hepatic, diabetes, rheumatism, inflammatory, microbial and cardiovascular diseases.

*Trianthena decandra* used as a health food for better health, stamina, immune modulator etc., in traditional medicine. But enhancement of male sexual performance by this weed is not known in the ethnomedical practices.

In this current study we attempted to investigate the Aphrodisiac effect of methanolic extract of *Trianthena decandra* using swiss albino mice viz assessment of mating in mice and effect on fertility in mice. In this study we observed significant enhancement in male sexual activity in normal mice.

Generally sexual behavior is enhanced by elevated testosterone levels. Drug induced changes in neurotransmitter levels or their action in the cells could also increase sexual behavior. Active investigations are in progress in this laboratory to explore these possible mechanisms of action. The drug may be of use for stimulating male sexual activity in cases where there are moderate sexual deficiencies. In the present study, the methanolic extract of this drug was found to be devoid of any general conspicuous short term toxicity studies as well as systemic toxicity, if any, remain to be studied. However, since this drug is used in ethnomedical practices without any recorded toxicity, this plant is likely to be a safe drug.

## CONCLUSION

The methanolic extract of *Trianthena decandra* was evaluated for its effect on the presence of sperm + ve females by performing assessment of mating model in mice. Methanolic extract of *Trianthena decandra* with three doses tested have significantly increased the number of sperm + ve females. It was also proved methanolic extract of *Trianthena decandra* has effect on litter size, the experiment fertility in mice model was selected. Methanolic extract of *Trianthena decandra* has shown an increase in the litter size but no effect on M/F ratio

The effect on fertility model, both standard Tentex forte and methanolic extract of *Trianthena decandra* (200 & 400 mg/kg) treated groups had exhibited significant increase in litter size. No effect was observed on M/F ratio with all doses of methanolic extract of *Trianthena decandra*.

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