EVALUATION OF ANTI DEPRESSANT ACTIVITY OF MIMOSA PUDICA LINN LEAVES EXTRACT USING SCREENING METHODS ON ALBINO WISTAR RATS

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ABSTRACT

Depression disorder has significant potential morbidity and mortality, contributing to suicide, incidence and adverse outcomes of medical illness, disruption in interpersonal relationships, substance abuse, and lost work time. The present study was designed to study the anti-depressant activity of the leaves extract of Mimosa pudica using forced swim test and tail suspension test on Swiss albino Rats. The anti-depressant activity of the leaves of Mimosa pudica was assessed using Chronic Unpredictable Mild-Stress (CUMS) induced depression in Rats. The animals were treated with the ethanolic extract of leaves of Mimosa pudica orally at two doses of 100; 200mg/kg body weight for eight days after CUMS induced depression in Rats. The results demonstrate that ethanolic extract of Mimosa pudica has got anti-depressant potential. The study showed that the extract of Mimosa pudica had significant antidepressant activity. The Microsoft excel was used to calculate the mean ± SEM and one way ANOVA followed by turkey multiple comparison test were used to analyzed the results. The extract presented significant antidepressant activity in Rats ($p<0.05$). This study was conducted to explore the antidepressant activity of leaves extracts of plant Mimosa pudica in CUMS induced Rats.

Keywords: Mimosa pudica, Antidepressant activity and forced swim test.

1. INTRODUCTION

Depressed patients commonly complain about feeling sad, lack of interest in their day to day work, inability to find pleasure in activities that would normally please others, and feelings of discontent. It is also associated with feeling of guilt or reduced self-worth, disturbed sleep, changes in appetite, and low energy. In severe forms of depression, patients are known to cause self harm or even suicide. Although drugs available for the therapy of depression, they have their limitations, such as delayed therapeutic response and low responders to these drugs, which poses a problem with patient compliance. Hence, there is a requirement for alternative treatment of depressive disorders with the use of medicinal plants.

The plant *Mimosa pudica* is a weed that grows in humid areas, open fields and by roadsides. It grows as a shrub, under 100 cm in height, and is easily identifiable by its characteristic 15 – 20 pairs of leaflets that folds when disturbed, and is hence known as "Lajwanti" in Hindi, and "Touch me not plant" in English. It is believed to be native to the Middle Americas and is now found in other in all tropical countries of the Asian subcontinent and South East Asia. It has been used as a folk lore medicine since many years because of its various medicinal properties, and because it is an easily cultivable plant and is abundantly available.

2. MATERIAL AND METHODS

2.1. Plant Material Collection

The fresh leaves of Mimosa pudica was collected from local market. The plant material was cleaned, reduced to small fragments, air dried under shade at room temperature and coarsely powdered in a mixer. The powdered material was stored or taken up for extraction process.

2.2. Preparation of plant extracts

Fresh leaves of Mimosa pudica leaf were collected and washed under tap water. The leaves extract used was prepared by taking 20gms of finely cut leaves into 250ml beaker containing 200ml of Ethanol. The contents were mixed well and then the mixture was boiled up to 50-60°C for 4-5hrs. Further the extract was filtered with whatmann filter paper. The filtrate was boiled until the concentrated residue is formed. The concentrated product was sealed in sample covers and stored under room temperature and used for further experiment to check the activities.

2.3. Experimental animals

Wistar rats (150-200 g) and Swiss albino Rats (18-22g) of either sex selected for the study. Animals were housed in appropriate cages in uniform hygienic conditions and fed with standard pellet diet (Amrul Laboratory Animal Diet)

and water ad libitum. All the animals were maintained under standard conditions, that is room temperature 26 ± 1°C, relative humidity 45 - 55% and12:12 h light – dark cycle. Animal studies had approval of IAEC.

2.4. Selection of dose for animal study

The dose considered for the experiment on rats was obtained from conversion of human dose of Mimosa pudica (3-5 g/kg). The conversion factor of human dose (per 200 g body weight) is 0.018 for rats and 0.002 for Rats. Hence the calculated dose for the rats (considering human dose3 and 5 g/kg) is 200 mg/kg and for Rats is 20 mg/kg. Acute toxicity was done at dose of 2000mg/kg body weight.

2.5. Acute oral toxicity:

The acute oral toxicity of Ethanolic extracts of Mimosa pudica was determined by using rats and Rats which were maintained under standard conditions.

The animals were fasted 12 hour prior to the experiment, up and down procedure OECD guideline no. 425 were adopted for toxicity studies. Animals were administered with single dose of individual extract up to 2000mg/kg and observed for its mortality during 2days and 7days study period (short term) toxicity and observed up to 7days for their mortality, behavioral and neurological profiles

2.6. Anti-depressant activity

Healthy Rats weighing 25-50g (3- 4 weeks of age) were divided into five groups, each consisting of six animals. Group 1 received only saline and not depression induced while all other groups were depression induced following the CUMS procedure. Group 2 received CUMS induced depression, Group 3 and 4 were treated with the seeds extract at the dose of 100 and 200 mg/kg body weight. The group 5 was treated with the standard drug (Imipramine hydrochloride) at the dose of 10 mg/kg body weight. All extracts and the standard drug were administered orally.

2.7.Sucrose Preference Test

This test was performed to evaluate the anhedonia, the core symptom of depression. In this, the Rats were allowed to drink sugar water 72 hour before the test. Two water bottles were kept simultaneously in each cage; one bottle filled with 1% sucrose solution whiles other with pure water.

The bottle position was switched every 12 hr. After that, the test was conducted at 5:00 pm on days 1 and day 42 of the study. The Rats were housed in individual cages and freed to access either of the two bottles containing 1% sucrose solution or water.12 The volume of consumed sucrose solution and water was recorded and the sucrose preference ratio (SPR) was calculated according to the following equation;

$$SPR = \frac{Sucrose\ intake\ (ml)}{Sucrose\ intake\ (ml) + water\ intake\ (ml)} \times 100\%$$

2.8. Forced Swimming Test

It is the most used behavioral model for screening anti-depressant activity in the rodents. In this, Rats were forced to swim in the open glass chamber (25×15×25cm) containing fresh water to a height of 15 cm and maintained at 26±1°C. Here the animal cannot get support either from walls or bottom of the chamber. Water is changed after each mouse is subjected to FST.

The duration of immobility of Rats was recorded during the last 4 minutes of the total 6 minutes testing period because the animals show vigorous movement during initial 2 minutes of the test. The Rats were considered immobile when they were ceased struggling and remained floating motionless in water, making only the movement to keep their head above water.

2.9. Tail Suspension Test

Tail suspension test is also performed for screening the antidepressant like activity in Rats. Firstly prior to the laboratory test, animals were brought in the lab to adapt the lab condition for 1-2 hr. In this test each individual animal were suspended to the edge of table, 50cm above the floor by the adhesive tape placed approximately 1cm from tip of the tail. The total period of immobility was recorded for each mouse manually for 6 min.

If the animals were completely passive and motionless then they were considered as immobile. For this test dim light room was preferred.

The results from the experiment are expressed as mean ± SEM. The statistical analysis was performed by using one-way analysis of ANOVA followed by Tukey's Multiple Comparison test using graph and pad version 5.01. The values of $P < 0.05$ was considered as statistically significant.

3. RESULTS AND DISCUSSION

3.1. Phytochemical screening of Mimosa pudica

The present investigation concluded that the isolated compounds from the plant Mimosa pudica shows the various Pharmacological effects was determined due to the presence of different phytochemical compounds. Further study is needed for the isolation of the constituents present in the plant and its individual pharmacological activity should need to consider and ultimately it should be implemented for the benefit to human beings.

Table 1: Phytochemical screening of Mimosa pudica

S.No	Phytoconstituents	Ethanolic
1.	Alkaloids	+
2.	Flavonoids	+
3.	Steroids	-
4.	Tannins	-
5.	Anthraquinones	-
6.	Terpenoids	+
7.	Cardiacglycoside	+
8	Saponins	+

3.2. Antidepressant activity of *mimosapudica*

After 42days of the treatment of varying concentration 100 and 200mg/kg of *Mimosapudica* extract

Showed that the high dose was effectively reduced the depressant activity 46.18 ± 1.92 as compared with standard drug 44.25 ± 36 represented in table2.

Table2: Percentage sucrose preference of rats during sucrose preference test

S.No	Groups	Dose	SucrosePreference(%)	
			AtDay1ofCUMS	AtDay42ofCUMS
1	Control	10ml/kgBW	73.52 ± 1.41	63.02 ± 2.16
2	NegativeControl	10ml/kgBW	64.15 ± 2.39	45.81 ± 0.19
3	PlantExtractMimosapudicatreated(lowdose-)	100mg/kgBW	69.43 ± 1.92	49.52 ± 3.10
4	PlantExtractMimosapudicatreated(Highdose)	200mg/kgBW	67.13 ± 2.72	46.18 ± 1.92
5	StandardDrugtreated(Imipramine)	10mg/kgBW	66.08 ± 1.16	44.25 ± 36

The forced swim test was carried out and the immobility time was determined of selected groups. After 8 days of continuous treatment and observation the result showed that 200 mg/kg of Mimosa pudica as compared with standard which was 35.33 ± 2.46 and 36.02 ± 3.41 showed significant result $p< 0.05$, represented in table 3.

Table 3: Effect of Mimosa pudica extracts on the immobility time of Rats during FST.

S.No	Groups	Dose	Immobilitytime(sec)	
			AtDay1ofTreatment	AtDay8ofTreatment
1	Control(Saline0.9%)	10ml/kgBW	27.44 ± 2.09	25.02 ± 3.10
2	NegativeControl(Foodandwater)	10ml/kgBW	92.13 ± 1.54	88.31 ± 2.72
3	PlantExtractMimosapudicatreated(lowdose-)	100mg/kgBW	53.26 ± 2.40	48.01 ± 2.60
4	PlantExtractMimosapudicatreated(Highdose)	200mg/kgBW	43.11 ± 2.26	35.33 ± 2.46
5	StandardDrugtreated(Imipramine)	10mg/kgBW	40.12 ± 2.53	36.02 ± 3.41

The tail suspension test was performed. All the groups animal were treated individually. The negative control groups which are induced with CUMS showed the maximum immobility time as compared to the normal control group which

was indicated the depressive effect. The standard drug (Imipramine) decreased the immobility time compared with negative control group, showed antidepressant activity. The test-2 group showed significant decreased immobility time compared with test-1 and negative control group which was indicated that test-2 shoed better anti-depressant effect, table 4.

Table 4: Effect of Mimosa pudica extracts on the immobility time of Rats during TST

S.No	Groups	Dose	Immobilitytime(sec)	
			AtDay1ofTreatment	AtDay8ofTreatment
1	Control(Saline0.9%)	10ml/kgBW	29.26±1.51	26.05±1.39
2	NegativeControl(Foodandwater)	10ml/kgBW	94.64±2.46	89.52±1.26
3	PlantExtractMimosapudicatreated(lowdose-)	100mg/kgBW	54.61±0.25	49.55±1.40
4	PlantExtractMimosapudicatreated(Highdose)	200mg/kgBW	44.20±2.44	38.21±3.29
5	StandardDrugtreated(Imipramine)	10mg/kgBW	41.08±1.81	37.16±1.09

4. CONCLUSION

The results obtained in this study indicate that the ethanol fractions of the leaves of *Mimosa pudica* have significant CNS Depressant activities in animal model systems. The medicinal values of the plant leaves may be related to their constituent phytochemical. So, further detailed investigations are needed to isolate and identify the active compounds present in the plant extract and its various fractions and their efficacy need to be done. It will help in the development of novel and safe drugs for the treatment of different types of CNS disorders. The result of the study showed that the selected plant possesses significant anti depressant activity. The leaves extract presented significant anti depressantactivity in Rats, from the above study it can be concluded that the crude ethanol extract of *Mimosa pudica* possesses significant antidepressant activity and appears to be attractive material for the further study and possible drug development.

5. REFERENCES

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