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Research Article

ANTIDEPRESSANT EFFECT OF ETHANOLIC EXTRACT OF MIMOSA PUDICA COMPARED WITH IMIPRAMINE IN MICE MODELS

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ABSTRACT

Objective: Depression was considered as mental illness worldwide. Various symptoms observed with depression are loss of interest, sad mood, disturbed sleep, low energy, and loss of appetite. *Mimosa pudica* is a traditional medicine having various medicinal properties. Imipramine is a tricyclic antidepressant drug used in depression. This study is to evaluate the antidepressant activity of ethanolic extract of *M. pudica* leaves and imipramine in mice models.

Methods: Swiss albino mice weighing 20–25 g of either sex was involved in study. In each study, the animals were divided into five groups (n=6). Drug was administered i.p. and the antidepressant activity was performed using tail suspension test (TST) and forced swim test (FST) in Group 1 – control group, Group 2 received imipramine (10 mg/kg), and Groups 3, 4, and 5 received *M. pudica* extract of (4, 6, 8 mg/kg).

Results: The study shows the significant reduction in immobility in acute and chronic study of TST and FST with *M. pudica* extract of (6 mg/kg) and imipramine when compared with control and other extracts of *M. pudica* (4 mg/kg and 8 mg/kg)

Conclusions: The study concluded that the ethanolic extract of *M. pudica* has significant antidepressant activity and can be, further, considered for the treatment of depression**.**

Keywords: Antidepressants, Imipramine, *Mimosa pudica.*

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INTRODUCTION

Depression has around 12–20% of worldwide prevalence in various forms [1]. The fourth most urgent health issue worldwide, according to the World Health Organization, is depression [2]. It must be distinguished from common grieving, sadness, disappointment, and dysphoria or demoralization brought on by medical conditions, as well as from bipolar disorder, in which depression fluctuates between hypomania and mania. Both the diagnosis and treatment of the condition are frequently inadequate. The effectiveness of the currently available treatments is about two thirds of depressed patients, but the extent of the improvement is still disappointing [3].

Imipramine is a tricyclic antidepressant. Imipramine was relatively ineffective in quieting agitated psychotic patients, but it remarkably affected depressed patients [4]. As it has side effects such as dry mouth, epigastric distress, constipation, tachycardia, palpitations, increased risk of glaucoma, hypotension, and urinary retention [5].

Mimosa pudica is said to be traditionally used in rural villages as a folk-lore medicine for people with mild-moderate depression [6]. The leaves of *M. pudica* are also used in the treatment of hemorrhoids, diarrhea, dysentery, fistula, hydroceles, and glandular swellings [7,8]. Roots are used for bronchitis, asthma, and productive cough. Powdered seeds are used for wounds and sores [9]. The plant, other than antidepressant effect, also has urolithiasis, anti-helminthic, anticonvulsant, anti-diabetic, analgesic, wound healing, and anti-asthmatic activity [10,11].

The purpose of study is to evaluate for antidepressant properties of ethanol extract of leaves of *M. pudica* in mice using forced swim test (FST) and tail suspension test (TST) which are behavioral provocative (despair).

METHODS

Ethical approval was obtained from the Institutional Animal Ethics Committee before starting the study (Ref No. IAEC/02/2012/CPCSEA). Swiss albino adult mice 30 in number weighing 20–265 g of either sex maintained under standard condition in the Institutional Animal House of A.J Institute of Medical Sciences were used. The animals were maintained at standard laboratory conditions of temperature and humidity with light and dark cycle of 12 h each. The study was performed in light phase.

The drug, imipramine, was obtained from Torrent Pharmaceuticals, while the *M. pudica* plant leaves were extracted with ethanol in Soxhlet extractor and obtained from Srinivas college of pharmacy.

The mice were divided into five groups; in each group, six mice were divided.

- Group 1 (control group) was pre-treated with normal saline (0.1 ml/10 g)
- Group 2 was pre-treated with imipramine at the dose of 10 mg/kg.
- Groups 3, 4, and 5 were pre-treated with three different doses (4, 6, and 8 mg/kg) of *M. pudica* leaves ethanol extract (EEMPL).

Each drug was administered intraperitoneally (0.1 ml/10 g).

For the acute study, 30 mice in one arm underwent the TST on day 1 an hour after receiving the corresponding drugs, while 30 mice in the other arm underwent the FST. On day 10, the mice were again given the respective drugs intraperitoneally and subjected to TST and FST for chronic study.

Procedure

FST

The approach adopted followed Porsolt *et al.* [12]. The mice were individually made to swim in a vertical plexiglass cylinder with a 5 L

Table 1: Effect of acute treatment of *Mimosa pudica* leaves extract on duration of immobility

Groups	Dose (mg/kg)	Duration of immobility in seconds (mean±SD) forced swim test	Duration of immobility in seconds (mean±SD) tail suspension test
1	Control (Normal saline 0.1 ml/10 gm, i.p)	93.33±32.44	210.50±30.27
2	Standard (Imipramine 10 mg/kg, i.p)	25.67±8.48***	105.83±13.15***
3	EEMPL (4 mg/kg, i.p)	85.33±32.72*	216.67±38.50**
4	EEMPL (6 mg/kg, i.p)	41.50±18.49***	120.50±21.36***
5	EEMPL (8 mg/kg, i.p)	83.67±11.55*	213.17±45.16**

The observations were mean±SD (ANOVA followed by Dunnett's multiple comparison test) *p>0.05 – Not significant, **p<0.05 – Significant, ***p<0.01 – Highly significant

Table 2: Effect of chronic treatment of *Mimosa pudica* leaves extract on duration of immobility in tail suspension test

Groups	Dose (mg/kg)	Duration of immobility in seconds (mean±SD) forced swim test	Duration of immobility in seconds (mean±SD) tail suspension test
1	Control (Normal saline 0.1 ml/10gm, i.p)	194.50±18.02	93.83±40.36
2	Standard (Imipramine 10 mg/kg, i.p)	135.17±28.04**	18.17±6.824***
3	EEMPL (4 mg/kg, i.p)	147.67±51.61*	82.33±49.65*
4	EEMPL (6 mg/kg, i.p)	109.67±19.49***	24.33±5.24***
5	EEMPL (8 mg/kg, i.p)	182.33±51.31**	82.17±37.76*

The observations were mean±SD (ANOVA followed by Dunnett's multiple comparison test)*p>0.05 – Not significant, **p<0.05 – Significant, ***p<0.01 – Highly significant

capacity, 50 cm height, 18 cm diameter, and 25°C water temperature. A pre-screening procedure involving mice lasted 15 min. The trial was conducted for 6 min, 24 h after pre-screening, of which the first 2 min were not recorded and the periods of inactivity for the final 4 min were timed (in seconds) with a stopwatch. When mice did not move at all or only moved enough to keep themselves afloat, they were regarded as immobile. After 6 min, the mice were removed from the plexiglass cylinder. They were dried with a dry towel and kept under a dim lamp for drying. The water was discarded after every test, and fresh water was used for the next mouse.

TST

The approach adopted followed Steru *et al*. [13] In-practice antidepressants have the ability to shorten the time that mice remain motionless when attempting to flee while suspended by their tail. This test was a trustworthy way to check for the presence of antidepressants, including those that work on the serotonergic system. Mice were attached with adhesive tape from their tail end and hung from a wooden rod 50–75 cm above the table. The first 2 min were not recorded, and the past 6 min immobility was monitored using a stopwatch and recorded (in seconds). Only when they were motionless and not trying to escape were mice considered to be immobile.

Statistical analysis

Each group's average time spent immobile is calculated. The information was displayed as Mean±SD. Using one-way ANOVA, the experimental and control groups were compared. Statistics were deemed significant at p=0.05.

RESULTS

Imipramine (10 mg/kg) and the test drug EEMPL (6 mg/kg) significantly decreased the immobility times in the acute study on day 1 when compared to the control group and other EEMPL (4 mg/kg and 8 mg/kg), as shown in Table 1.

When compared to the control group and other EEMPL (4 mg/kg and 8 mg/kg), EEMPL (6 mg/kg) and imipramine (10 mg/kg) in the chronic study demonstrated a significant reduction in immobility times on day 10. These results were seen in both the forced arm and tail suspension methods, as shown in Table 2.

DISCUSSION

The effectiveness of antidepressants in the forced swim and TST in the present study shows a strong correlation. All major classes of antidepressants, including tricyclics, selective serotonin reuptake inhibitors, monoamine oxidase inhibitors, and atypical antidepressants, are detectable by these tests, which are very sensitive and relatively specific [14].

According to the study, imipramine, a common antidepressant drug, and *M. pudica* leaves have similar antidepressant effects. In both the TST and the FST of depression, ethanol extract of *M. pudica* leaves at a dose of 6 mg/kg significantly decreased the duration (time) of immobility of animals compared to the control, indicating that it has significant antidepressant activity. In both the models for acute and chronic drug administration, the *M. pudica* leaves dose-dependent antidepressant activity was seen.

Alkaloids, flavonoids, and tannins were discovered in the extract after phytochemical analyses was conducted in the study. The previous mentioned phytoconstituents are most likely responsible for the antidepressant effects of *M. pudica* [15]. Its underlying mechanism of action in treating depression needs to be better understood through additional pharmacological research.

CONCLUSIONS

The study suggests that the ethanolic extract of *M. pudica* leaves has anti-depressant effect when compared with control. For further utilization in the therapy of depression, it requires further testing along with human studies to strengthen these observations.

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CONFLICTS OF INTEREST

No.

SOURCE OF FUNDING

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