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Research Article

PHARMACOLOGICAL SCREENING OF *MIMOSA PUDICA* FOR ITS ALLEGED SEDATIVE HYPNOTIC ACTIVITY

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Abstract

Mimosa pudica Linn. (Mimosaceae), a sensitive plant, has been used in traditional healthcare system in the treatment of leprosy, dysentery, vaginal and uterine complaints, inflammations, burning sensation, asthma, leucoderma, fatigue and blood diseases. In Siddha literatures it is also known to have Sedative Hypnotic activity. So, the present study was aimed to investigate the Sedative Hypnotic activity of *Mimosa pudica*. Roots of *Mimosa pudica* were macerated with hydro alcohol (methanol: water). The extract obtained was studied for Sedative Hypnotic activity using Actophotometer, Rota rod apparatus and righting reflex method. Oral dose of 600 mg/kg and 800 mg/kg administered to Swiss albino mice reflected reduced locomotor activity, produced muscle relaxation and showed loss of righting reflex when compared with the Standard Diazepam. This substantiates the traditional use of *Mimosa pudica* roots for Sedation and Hypnosis.

Key words: *Mimosa pudica* roots, Sedation, Hypnosis, Actophotometer, Muscle relaxation, Potentiation.

Introduction

Advance in science and technology has contributed to an enormous improvement in the quality of life of humankind. However, modern life stress, associated trials and tribulation are responsible for the surge in incidence of variety of psychiatric disorders. Path breaking research in psychopharmacology has flooded the market place with drugs for specification. For instance, benzodiazepines (diazepam, nitrazepam lorazepam and alprazolam etc.) are the most frequently prescribed synthetic drugs for variety of condition particularly anxiety, depression, epilepsy and insomnia. But these psychoneural drugs have very serious side effects. Chronic use of benzodiazepines causes deterioration of cognitive function, physical dependence and tolerance (Dhawan et al.,

2003). In this context, a resurgence of interest in medicine from natural sources (mainly plant products) is seen and there is tremendous hope that drugs of plant origin will have significantly lesser side effects than that observed with synthetic drugs while having comparable efficacy.

Mimosa pudica Linn. commonly known as sensitive plant, humble plant or touch me not belongs to the family Mimosaceae. It is a small, prostrate or ascending, short-lived shrub. It may reach 1 m in height when supported on other vegetation and more than 2 m in horizontal extension. The reddish-brown, woody stems are sparsely or densely armed with curved prickles. The root system consists of a taproot and extensive fibrous roots with nodules. The twigs are fine and flexible and support leaves with one or two pairs of pinnae and 15 to 25 pairs of oblong leaflets 3 to 12 mm long. The flowers are pink and clustered in globose heads. The legume (pod) is linear-oblong, 1.0 to 1.5 cm long and 3 mm broad, with bristles on the margins. The pods are born in groups and contain two to four brown seeds. Sensitive plant was first described from Brazil and is perhaps native to much or all of the New World Tropics. Today, it is pantropical in its distribution. In traditional healthcare system it has been used in the treatment of leprosy, dysentery, vaginal and uterine complaints, inflammations, burning sensation, asthma, leucoderma fatigue and blood diseases. In Siddha literatures it is also known to have Sedative Hypnotic activity. Phytochemical reports indicates the presence of Mimosine which is a toxic alkaloid. Adrenaline like substance has been identified in the extract of its leaves. Some workers have reported the presence of Crocetin dimethyl ester in the extract of the plant. Roots contain tannin up to 10 per cent. Seeds contain a mucilage which is composed of d-xylose and d-glucuronic acid. The plant extract contains green yellow fatty oil up to 17 per cent. The plant is reported to contain tubuline and a new class phytohormone turgorines is found to be active in the plant. The periodic leaf movement factors are reportedly the derivatives of 4-o-(b-D-glucopyranosyl-6-sulphate) Gallic acid3. Based on above information it was thought to evaluate roots of *Mimosa pudica* for the alleged sedative hypnotic activity. (Azmi et al., 2011; Kumar et al., 2009)

Material and Methods

Plant material:

The plant was procured from the Herbal garden of Gurunanak College of Pharmacy, Nagpur in the month of November 2011. Later it was authenticated from Department of Botany, Rashtrasant Tukadoji Maharaj Nagpur

University, Nagpur, Maharashtra, India. A voucher specimen **(No.9283)** was deposited at Department of Botany, Nagpur, India.

Preparation of extract

The roots of the plant were collected and washed with water to remove earthy matter. Then subjected to sun drying followed by air drying under shed for two days. Then the dried roots were crushed into coarse powder with the use of mixer grinder. The crushed material weighing about 100 gm was subjected for Soxhlet extraction with the solvent petroleum ether (60-80^{o}C) for approximately 40 cycles to defatt the drug material. After complete defatting, the mark was removed, dried in air and further subjected to maceration with Hydro alcohol (Methanol and Water 1:1). The extracted material was filtered and the solvent was distilled off using distillation assembly. It was further dried by heating on water bath. Finally the extracts were stored in desiccators for further studies.

Experimental protocol

Swiss strain male albino mice (20–30 g) were procured from animal house of Gurunanak College of Pharmacy, Nagpur and housed in polypropylene cages at 25 ± 2°C and maintained on a daily scheduled of standard laboratory pellet diet. Drinking water was supplied *ad libitum*. Swiss albino mice were divided into four groups (n=6). Group one and two received graded dose of hydro alcoholic root extract 600 and 800 mg/kg. Group three received the Standard drug (Diazepam) 3 mg/kg and group four received normal saline solution 10 ml/kg. The experiments were conducted according to the guidelines of the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Government of India and approved by Institutional Animal Ethical Committee (IAEC) of Gurunanak College of Pharmacy, Nagpur. IAEC Approval Number-GNCP/IAEC/2011-2012/PC-2.

Drug/ Chemicals

The Diazepam vial (10 mg/2 ml) was procured from the local Chemist and Druggist and was used as a standard.

Test for locomotor activity

The spontaneous locomotor activity of each mouse was recorded individually for 5 min using Actophotometer. Two doses of hydro alcoholic root extract (600 and 800 mg/kg orally) were administered 60 min

before the test and Diazepam (3 mg/kg *i.p*) used as a standard was given 30 min before the test. The control group was treated with normal saline solution (10 ml/kg *i.p*) 60 min before the test. (Tatarezynska et al 2004)

Muscle Co-ordination test

This test was carried out using rota rod apparatus. Swiss albino mice underwent a pre-test on the apparatus. Only those animals, which had demonstrated their ability to remain on the revolving rod (25 rpm) for 5 min, were used for the test. Two doses of hydro alcoholic root extract (600 and 800 mg/kg) were administered orally, the standard group was treated with diazepam (3 mg/kg) intraperitonially and control group received normal saline (10 ml/kg) solution intraperitonially. The test was carried out 60 min after administration of drugs and vehicle. (Allmark et al., 1949)

Diazepam induced sleep in mice

Diazepam (15 mg/kg) was injected i.p. 60 min after administration of hydro alcoholic root extract. The mice were treated with two different doses of hydro alcoholic root extracts (600 and 800 mg/kg, $n = 6$), the positive control group ($n = 6$) was administrated with diazepam (15 mg/kg, i.p.), respectively. The effect was recorded for disappearance (latency) and reappearance (duration) of the righting reflex. Hypnotic sleeping time was considered to be the time interval between disappearance and reappearance of the righting reflex. (Allmark et al 1949; Baker 1920)

Statistical analysis

Results were expressed as Mean ± SEM. The differences between experimental groups were compared using one-way Analysis of Variance (ANOVA) followed by Dunnett's test and were considered statistically significant when $p<0.05$. (Kavita Gahlot et al., 2011)

Table 1: Effect of Diazepam and root extract 600 and 800 mg/kg on locomotor activity.

Groups	Actophotometer score
Control	133.67 ± 9.804
Diazepam	6.833 ± 1.887
Hydro alcoholic(Methanol) 600 mg/kg	22.0 ± 8.414
Hydro alcoholic(Methanol) 800 mg/kg	22.667 ± 7.060

All values are Mean ± SEM. **P<0.01 when extract and diazepam compared with control, n=6.

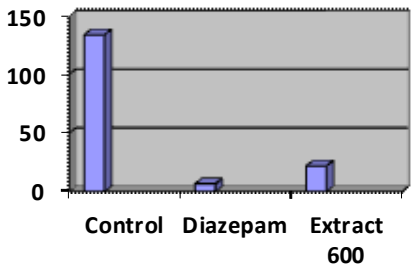

Figure 1: Effect of diazepam and root extract 600 mg/kg on locomotor activity.

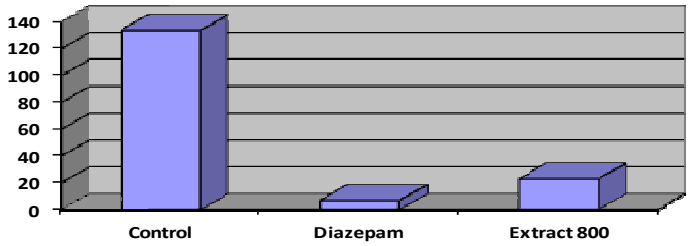

Figure 2: Effect of diazepam and root extract 800 mg/kg on locomotor activity.

Table 2: Effect of Diazepam and root extract 600 mg/kg on muscle relaxant activity.

Groups	Rota rod score
Control	142.98 ± 44.685
Diazepam	4.083 ± 0.4705
Hydro alcoholic(Methanol) 600 mg/kg	27.882 ± 6.476

All values are Mean ± SEM. **P<0.01 when Diazepam compared with control and *P<0.05 when extract compared with control, n=6.

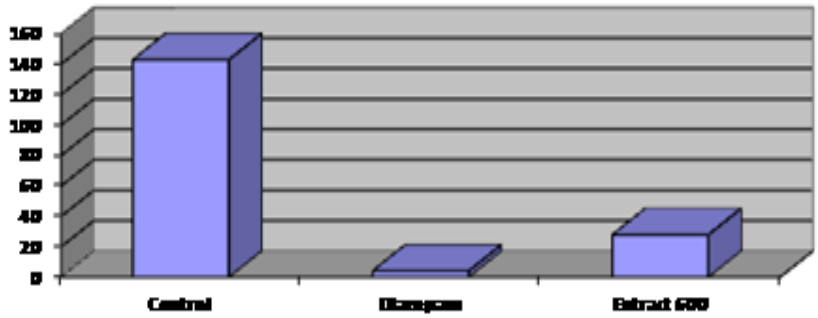

Figure 3: Effect of diazepam and root extract 600 mg/kg on muscle relaxant activity.

Table 3: Effect of Diazepam and root extract 800 mg/kg on muscle relaxant activity.

Groups	Rota rod score
Control	63.563 ± 9.390
Diazepam	4.083 ± 0.4705
Hydro alcoholic(Methanol) 800 mg/kg	15.785 ± 1.207

All values are Mean ± SEM. **P<0.01 when diazepam and extract compared with Control, n=6.

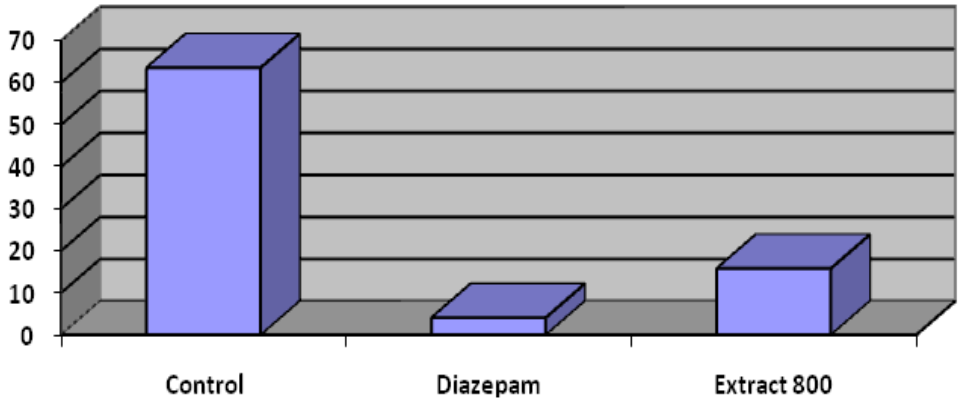

Figure 4: Effect of diazepam and root extract 800 mg/kg on muscle relaxant activity.

Table 4: Effect of root extract in Diazepam induced sleep.

Groups	Potentiation effect
Diazepam(15 mg/kg)	46.872 ± 1.986
Diazepam + Extract(600 mg/kg)	75.557 ± 5.063
Diazepam + Extract(800 mg/kg)	80.833 ± 1.558

All values are Mean ± SEM **P<0.01 when compared with Diazepam, n=6.

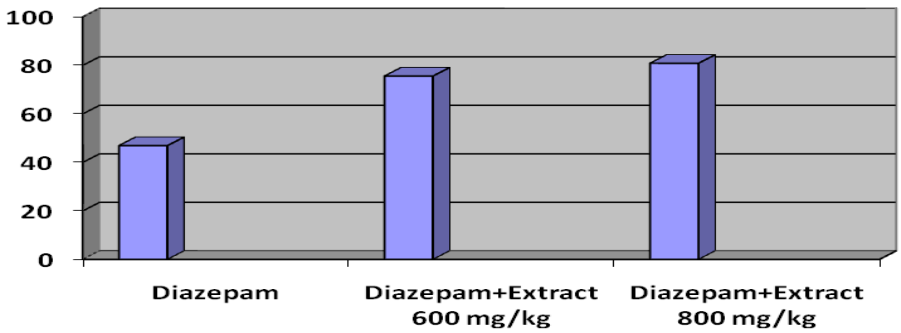

Figure 5: Effect of root extract on diazepam induced sleep.

Results

Test for locomotor activity

The hydro alcoholic root extract at dose of (600 and 800 mg/kg) and Diazepam at 3 mg/kg reduced the locomotor activity significantly (Table 1).

Test for muscle co-ordination

In this test, hydro alcoholic root extract (600 and 800 mg/kg) significantly reduced the time spent by the animals on revolving rod when compared to control. The standard drug (diazepam) also showed significant effect when compared to control (Table 2 and Table 3).

Diazepam induced sleeping time

The hydro alcoholic root extract (600 and 800 mg/kg) significantly increased the diazepam induced sleeping time (Table 4).

Discussion

The study reflected that Hydro alcoholic root extract (600 and 800 mg/kg) possess sedative and hypnotic activity. The hydro alcoholic root extract potentiated the sleep induced by diazepam suggesting that it possess significant sleep inducing property. The study on the spontaneous motor activity showed that hydro alcoholic root extract (600 and 800 mg/kg) reduced the frequency and the amplitude of movements. The reduction of the spontaneous motor activity could be attributed to the sedative effect of the extract. The hydro alcoholic root extract (600 and 800 mg/kg) reduced the time spent on the revolving rod by mice in the rota rod test, a test mainly used to screen centrally acting muscle relaxants. This represented that the hydro alcoholic root extract have significant muscle relaxant activity, which could be due to CNS depressant activity.

So, we can say that the above results substantiate the traditional use of *Mimosa pudica* for Sedation and Hypnosis.

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