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Original Research Article

Evaluation of Analgesic Property of Ethanolic Extract of *Mimosa Pudica* Leaves in Swiss Albino Mice

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Abstract

Introduction: Pain is a localized or generalized, unpleasant sensation that causes a person physical discomfort or mental stress. It is a multi-dimensional experience which involves both the sensory and affective components. Many unpleasant feelings are associated with pain. Analgesia is the absence of pain in response to stimulation that would normally be painful. *Mimosa pudica* is a source of natural origin which has numerous medical benefits and has a tremendous future potential for research. The present study was undertaken to screen for analgesic property of Ethanolic Extract of *Mimosa pudica* (EEMP).

Objective: To evaluate the potential analgesic effects of Ethanolic Extract of *Mimosa pudica* leaves on thermal induced pain in Swiss Albino mice.

Materials and Methods: Swiss albino mice of either sex weighing 20-30 g were used. Thirty mice were divided into 5 groups each having 6 mice. Group 1 received normal saline (10 ml/kg per oral.). Group 2 received Pentazocine (standard 10 mg/kg intra peritoneal.).

Group 3, 4 and 5 received test compound Ethanolic Extract of *Mimosa pudica* in doses 100 mg/kg, 200 mg/kg, 400 mg/kg per oral respectively. Analgesic property was evaluated using Eddy's Hot plate method on day 1 and day 10.

Results: The study showed increase in reaction time in Eddy's Hot plate method on day 1 and day 10 in EEMP treated groups when compared with control group.

Conclusion: The study suggests that Ethanolic extract of *Mimosa pudica* (EEMP) has analgesic property and can be considered for use in treatment of pain after further testing.

Keywords: *Mimosa pudica,* Pentazocine, Analgesic Property, Ethanolic Extract

Introduction

Pain is a localised or generalized, unpleasant sensation that causes a person physical discomfort or mental stress. It is a multi-dimensional experience which involves both

the sensory and affective components. Many unpleasant feelings are associated with pain. The official definition of pain by the International Association for the Study of Pain (IASP) is: “an unpleasant sensory and emotional experience, associated with actual or potential tissue damage” [1]. The word comes from the Greek word “Poine”, generally meaning "price paid, penalty, punishment" [2].

Analgesia is the absence of pain in response to stimulation that would normally be painful. Pain sensation arises due to highly complex mechanisms which are integrated at all levels - central and peripheral [3].

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 itself when disturbed and is hence known as “Lajwanti” in Hindi, and “Touch me not plant” in English (in Latin "pudica" means shy) [4]. It is believed to be native to the South America and Central America and is now found in other in all tropical countries of the Asian subcontinent and Southeast Asia [5]. *Mimosa* belongs to the taxonomic group Magnoliopsida and belonging to family Mimosaseae. 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.

Historically, it has been used in treatment of hemorrhoids, anal fistulas, diarrhea and dysentery. The plant roots were used in treatment of respiratory conditions like cough, asthma and in urinary infections [6]. Phytochemical studies revealed the presence of alkaloids, amino acid, flavonoids, glycosides, sterols, terpenoids, tannins and fatty acids in this plant [7]. *Mimosa pudica* is a source of natural origin which has numerous medical benefits and has a tremendous future potential for research.

Hence, if a drug could be prepared from medicinal plants, which has analgesic property, it can be used to treat both acute and chronic painful ailments while helping to avoid the side effects known with the currently available drugs in the market. With this background in mind the present study was undertaken to screen for analgesic and anti-inflammatory properties of Ethanolic Extract of *Mimosa pudica* (EEMP).

Materials and Methods

Ethical clearance was obtained from the Institutional Animal Ethics Committee before starting the study (Approval No. AJIMS/IAEC/18-19/03 dated 12 -11-2018).). The Registration number of Institutional Animal Ethics Committee is 1075/PO/Re/S/07/CPCSEA dated 27/07/2017.

Swiss albino mice, 30 in number, aged around 3-4 months weighing 25 to 30gms were housed at a room temperature of 24 ± 2°C in tidy polypropylene cages. 12:12 hour of light and dark cycle was maintained. They were provided free access to the commercially available chow pellet and drinking water was provided in bottles ad libitum. All the experimental procedures were done within light part of their light and dark cycle.

The standard drug, Pentazocine was obtained from Themis medicare Ltd (TAZOWIN, 30mg/1ml ampoule). *Mimosa pudica* plant was obtained from district Udupi, Karnataka, India. The plant was authenticated by Jyothi K T, Lecturer and HOD, Department of Botany, Sri Siddhartha First Grade College, Tumkur. The *Mimosa pudica* plants were washed, the leaves were shade dried and powdered. About 200 g of the dried leaf powder of *Mimosa pudica* was extracted with 250 ml of 99.9% Ethanol in Soxhlet extractor for about 36 hours. The ethanol was then evaporated from the mixture by placing it in a beaker and heating it over a water bath. The extract gave a yield of brownish paste like

mass weighing 6 g. The yield obtained was 3% w/w with respect to dried powder [8].

Swiss albino mice (n=30) of either sex weighing 25-30 grams were divided into 5 groups, each group having six mice. Only animals having basal reaction time not exceeding 15 seconds were included in the study.

Group 1 received normal saline (10 ml/kg per oral.)

Group 2 received Pentazocine (standard 10 mg/kg intra peritoneal.)

Group 3, 4 and 5 received test compound Ethanolic Extract of *Mimosa pudica* in doses 100 mg/kg, 200 mg/kg, 400 mg/kg per oral respectively.

For the acute study, on day 1, mice were placed on Eddy's Hot plate and reaction time was noted and for subacute study, on day 10, mice were subjected again to hot plate method.

Procedure

Eddy's Hot plate method

After treatment mice were placed individually on Eddy 's hot plate maintained at 55 ± 1°C and the reaction was noted. Licking of paw or jumping whichever was observed first was taken as the end point. Observations were made at 0, 20, 60 and 90 minutes following the administration of drugs. The administration of drug was continued for next 9 days. On day 10, the same procedure was repeated, and values tabulated to determine the subacute effect of administration of the test compound.

Statistics

The recorded data was entered in Microsoft Excel. Values were expressed as Mean ± SEM (standard error of mean). Probability 'p' values were assessed using One Way Analysis of Variance (ANOVA) followed by *post hoc* Dunnet's Multiple Comparison test (Analystat ver.1.6.50). p Value <0.05 was considered as statistically significant.

Results

In Acute study, Group 1, which was treated with Normal Saline, showed no significant change in reaction times during the entire test period of 90 minutes. Group 2, treated with Pentazocine (10 mg/kg) i.p., showed a statistically significant increase in reaction time from 20 minutes to 90 minutes when compared to control, with maximum effect seen 60 minutes after drug administration. Group 3, treated with EEMP 100mg/kg showed an increase in reaction times, with maximum effect seen at 60 minutes, when compared to control. Group 4, EEMP 200mg/kg, showed significant increase in reaction time when compared to control with maximum effect seen at 60 minutes after drug administration and was comparable to Group 2 at 20, 60 and 90 minutes of testing. Group 5, EEMP 400 mg/kg, showed a significant increase in reaction time when compared to control with maximum effect seen at 60 minutes after drug administration, and was comparable to Group 2 standard drug at 60 and 90 minutes.

In Subacute study, Group 1, which was treated with Normal Saline, showed no significant change in reaction times during the entire test period of 90 minutes. Group 2, treated with Pentazocine (10 mg/kg) i.p., showed a significant increase in reaction time from 20 minutes to 90 minutes when compared to control, with maximum effect seen 60 minutes after drug administration. Group 3, treated with EEMP 100mg/kg showed an increase in reaction times from the start at 0 minutes, with maximum effect seen at 60 minutes, when compared to control. Group 4, EEMP 200mg/kg, also showed significant increase in reaction from 0 minutes when compared to control with maximum effect seen at 60 minutes after drug administration and was comparable to Group 2 at all times. Group 5, EEMP 400 mg/kg,

showed a significant increase in reaction from 0 minutes when compared to control with maximum effect seen at 60 minutes after drug administration, and was comparable to standard drug Group 2.

Table 1: Eddy's hot plate method Day 1

Day 1	Latency Period in seconds				
Time	Group 1	Group 2	Group 3	Group 4	Group 5
	NS	Pentazocine 10mg/kg	EEMP 100mg/kg	EEMP 200mg/kg	EEMP 400mg/kg
0 min	5.33± 0.76	6.67± 0.49	5.67± 0.84	6.33± 0.80	6.17± 0.48
20 min	6.00± 0.51	11.00± 0.86**	7.00± 0.58##	9.50± 0.62*	7.67± 0.42#
60 min	4.33± 0.33	11.50± 0.43**	8.00± 0.69**##	9.83± 0.48**	10.50± 0.62**
90 min	5.33± 0.49	7.50± 0.89*	7.67 ± 0.42*	7.83± 0.48*	7.67± 0.42*

Values are expressed as Mean ± SEM.
Significant at $p < 0.05$ * & $p < 0.01$ ** compared to control; Significant at $p < 0.05$ # & $p < 0.01$ ## compared to standard

Table 2: Eddy's hot plate method Day 10

Day 10	Latency Period in seconds				
Time	Group 1	Group 2	Group 3	Group 4	Group 5
	NS	Pentazocine 10mg/kg	EEMP 100mg/kg	EEMP 200mg/kg	EEMP 400mg/kg
0 min	5.50 ± 0.43	7.17 ± 0.48	7.83 ± 0.48*	8.50 ± 0.56**	9.17 ± 0.48**#
20 min	5.17 ± 0.60	9.33 ± 0.49**	8.83 ± 0.54**#	9.33 ± 0.49**	10.67 ± 0.56**
60 min	5.17 ± 0.60	12.67 ± 0.71**	9.67 ± 0.71**#	10.67 ± 0.76**	12.83 ± 0.60**
90 min	5.83 ± 0.65	9.83 ± 0.75**	8.00 ± 0.26*	9.00 ± 0.52*	10.00 ± 0.37**

Values are expressed as Mean ± SEM.
Significant at $p < 0.05$ * & $p < 0.01$ ** compared to control; Significant at $p < 0.05$ # & $p < 0.01$ ## compared to standard

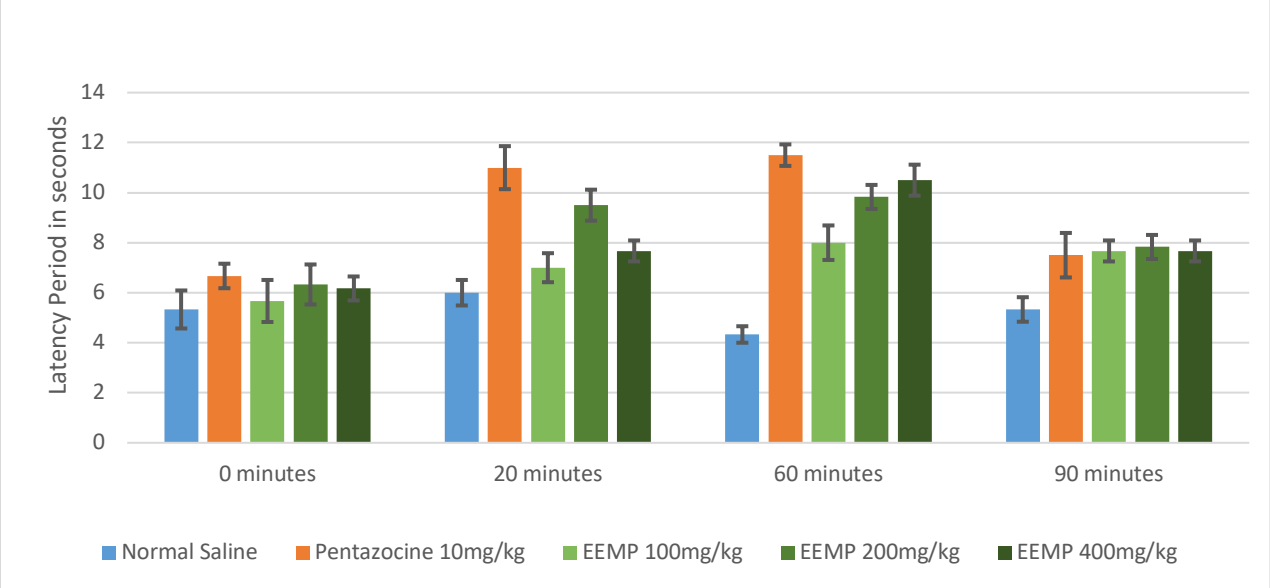

Figure 1: Eddy's hot plate method Day 1

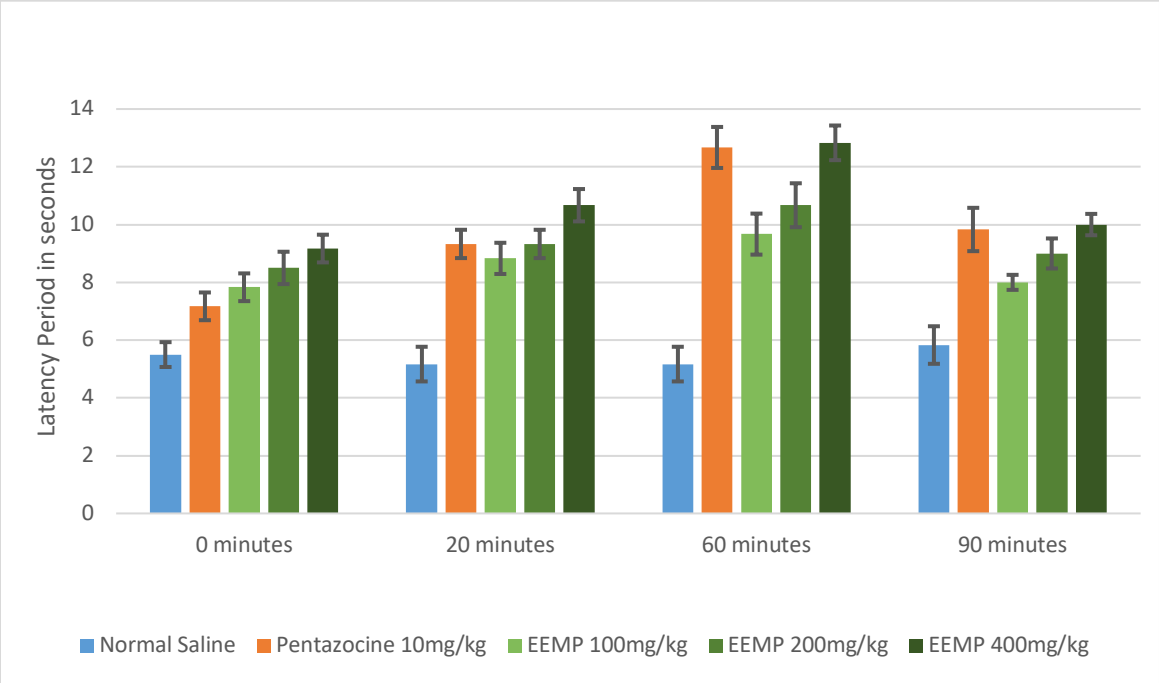

Figure 2: Eddy's hot plate method Day 10

Discussion

Mimosa pudica is a widely distributed plant that grows in most tropical areas of the world. It has been used in folk lore medicines since many generations because of its many proclaimed medicinal properties. It has claimed efficacy for antiulcer, wound healing, antioxidant, antimicrobial, anticonvulsant and antidepressant activities, to name a few. Mimosa pudica has been found to be useful in the treatment of edema, rheumatism, myalgia and in different painful conditions in traditional and tribal medicine. In this present study, we evaluated the analgesic and anti-inflammatory activity of Ethanolic Extract of Mimosa pudica leaves in vivo.

We measured the analgesic activity to thermal stimuli in mice using the hot plate test, which is a sensitive acute pain test for detecting opiate analgesia as well as several types of hyperalgesia reactions from spinal origin. Eddy's hot plate test is a simple and sensitive procedure to evaluate analgesic and hyperalgesic reactions in mice. This method is considered to be selective for opioid-like compounds in animals [9]. The results indicate that the oral administration of EEMP significantly increased the hot plate thermal stimulation reaction times. Hot plate method is normally used to study the central analgesics effects of drugs. Therefore, it is probable that Mimosa pudica could be producing its effects centrally. This shows that the extract may have increased the stress tolerance capacity of the animals by possible involvement in higher centre. Although the underlying mechanism is unknown, the observed activity can be attributed to the overall effects of the plant constituents or the components having similar structure to opioids.

Conclusion

In the analgesic screening done by Eddy's Hot Plate method, EEMP showed significant analgesic activity at all doses (100, 200, 400 mg/kg), with EEMP at 400 mg/kg showing comparable action to standard drug Pentazocine (10mg/kg) in both acute and subacute study. Although the mechanism is

not well understood, Mimosa pudica leaves are known to have the phytoconstituent flavonoids, which inhibit prostaglandins that are involved in pain perception, through opioidergic mechanism.

The observed analgesic property should be substantiated in further models and studies and explore the active component involved in these activities.

The results from this study conclude that Mimosa pudica leaf extract has analgesic property and can find application in conditions like rheumatoid arthritis, osteoarthritis, acute appendicitis, neuritis, post viral arthritis and chronic gout.

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