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**EVALUATION OF ANTI ULCER ACTIVITY OF *MIMOSA PUDICA***

**ETHANOLIC EXTRACT IN RATS**

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**ABSTRACT**

To evaluate ethanolic extracts of *Mimosa pudica* for its antiulcer activity in rats. Ethanol and indomethacin induced ulcers in rats model were used to evaluate antiulcer activity. Two doses of ethanolic extracts i.e. 250mg/kg and 500mg/kg were considered to evaluate anti-ulcer activity in both models. Scoring for ulcer was done as 0 for no ulcer, 1 for mild ulcer, and 2 for deep ulcer and volume of gastric acid secreted and its pH was also determined. In both the studies, there was no ulceration in saline treated group but in positive control group animals showed presence of deep ulcers, rise in gastric acid secretion and reduction pH. In both the models, animals treated with 250mg/kg EEMP shows mild ulcers, while animals treated with ranitidine and ethanolic extract of *Mimosa pudica* 500mg/kg (EEMP) shows no ulcers. EEMP (250mg/kg) showed slight reduction in gastric acid secretion but there was significant decrease in ranitidine and EEMP (250mg/kg) treated animals. Results obtained from above study suggest that the ethanolic extract of *Mimosa pudica* is having significant anti-ulcer activity.

**Keywords:** Ethanol, Indomethacin, Ulcer score, Ranitidine, Wistar rats.

**INTRODUCTION**

Peptic ulcers are craters or open sores in the lining of the upper gastrointestinal tract. They include duodenal ulcers (those that are located in the top of the small intestine or duodenum) and gastric ulcers (those found in the stomach).<sup>[1]</sup> Gastric ulcer is among the most serious diseases in the world. The etiology of gastro-duodenal ulcers is influenced by various aggressive and defensive factors such as acid-pepsin secretion, parietal cell, mucosal barrier, mucus secretion, blood flow, cellular regeneration and endogenous protective agents such as prostaglandins and epidermic growth factors.<sup>[2]</sup> Some other factors, such as inadequate dietary habits, excessive ingestion of non-steroidal antiinflammatory agents, stress, hereditary predisposition and infection by *Helicobacter pylori*, may be responsible for the development of peptic ulcer.<sup>[3]</sup>

In spite of the progress in conventional chemistry and pharmacology in producing effective drugs, the plant kingdom might provide a useful source of new antiulcer compounds for development as pharmaceutical entities or, alternatively, as simple dietary adjuncts to existing therapies.<sup>[4]</sup> *Mimosa pudica* is the traditional medicinal plant used to treat various disorders in Ayurveda and other older systems of medicine and used in the treatment of ulcers. Hence this study was performed to evaluate the anti-ulcer activity of ethanolic extract of *Mimosa pudica* (EEMP).

## MATERIALS AND METHODS

**Animals:** Male wistar rats purchased from National Institute of Mental Health And Neuro Sciences(NIMHANS), Bangalore were used for the study.

**Preparation of Extract**<sup>[5]</sup>: The plant material was collected from outskirts of Bangalore and authenticated in Department of Botany, Bangalore university. The plant was collected in the month of May 2008 and shade dried at room temperature. The leaves were shade-dried and made into a coarse powder which was passed through a 40-mesh sieve to get a uniform particle size and then used for extraction. Successive extraction has been done and ethanolic extract was collected

**Preliminary phytochemical investigation:** The preliminary phytochemical investigation was performed as described by Khandewal<sup>[6]</sup>

**Acute oral toxicity:** Acute oral toxicity study for ethanolic extract of *Mimosa pudica*(EEMP) was conducted according to OECD guidelines.<sup>[7]</sup>

**Evaluation of antiulcer activity**<sup>[8]</sup>: Following two models have been used to study the effect of *Mimosa pudica* extract on ethanol and indomethacin induced ulcers.

**Ethanol induced ulcer:** After 12 hour of fasting, the rats were randomly divided into five groups of six animals each. First group serves as Normal control which is treated with saline only, second group serves as Positive control, and the third group was treated with Ranitidine (standard group) 50 mg/kg. The remaining groups received 250 mg/kg and 500mg/kg of EEMP respectively. All the treatments were administered orally. One hour after treatment, all the rats received 1ml of 99.5% ethanol to induce gastric ulcer. One hour later, the animals were sacrificed by cervical dislocation and the stomachs were removed. Gastric acid was collected and its pH was determined. Stomachs were opened along the greater curvature and gently rinsed with water for subsequent scanning. The

ulcers were classified as 0 – Normal stomach, 1- spot ulceration, 1.5- Hemorrhagic streaks, 2- ulcer. Gastric acid was collected; its volume and pH were estimated.

**Indomethacin induced ulcer:** After 12 hour of fasting, the rats were randomly divided into five groups of six animals each. First group serves as Normal control which is treated with saline only, second group as Positive control, and the third group was treated with Ranitidine (standard group) 50 mg/kg. The remaining groups received 250 mg/kg and 500mg/kg of EEMP respectively. Indomethacin has been administered to all groups except normal group to induce ulcer after one hour after drug treatment. After one hour, the animals were sacrificed by cervical dislocation and the stomachs were removed. Gastric acid was collected and its pH was determined. Stomachs were opened along the greater curvature and gently rinsed with water for subsequent scanning. The ulcers were classified as 0 – Normal stomach, 1- spot ulceration, 1.5- Hemorrhagic streaks, 2- ulcer. Gastric acid was collected; its volume and pH were estimated.

**Preliminary phytochemical investigation:** The results of this study reveals that the methanolic extract contains Glycosides, alkaloids and alcoholic extract contains alkaloids, proteins and tannins.

**Acute oral toxicity:** The study suggested that, the methanolic extracts was found to be safe up to the dose of 2000mg/kg.

**Ethanol-induced ulcer model:** In normal animals, there was no ulcers found while administration of ethanol produced severe hemorrhagic gastric lesions in positive control group but the pretreatment with 250 mg/kg and 500 mg/kg of EEMP and Ranitidine 50 mg/kg significantly ( $p < 0.05$ ) reduced the number of ulcers, in comparison with positive control group. (see Table no:1 and Fig 1-5). Extracts and ranitidine caused dose dependent reduction in gastric acid secretion and rise in its pH.

**TABLE 1: EFFECT OF EEMP ON GASTRIC ACID SECRETION AND ULCER SCORE IN ETHANOL INDUCED ULCER MODEL**

Group	No of ulcer	%inhibition	Gastric volume (ml/100 g body weight)	Gastric pH
Normal (Saline)	00	--	2.94±0.08	3.41±0.7
Control (Ethanol)	6±0.87	0	5.6±0.21	2.12 ± 0.1
Ranitidine	0	100	3.31±0.15***	3.54±0.11
EEMP 250mg/kg	2±0.41	33.33	4.24±0.28**	2.8±0.17**
EEMP 500mg/kg	0	0	2.9±0.08***	3.92±0.1***

Values are Mean ± S.E.M. (n=6); Significance values are

\*\*\* $P < 0.001$ , \*\* $P < 0.01$  and \* $P < 0.05$ . Control group vs all groups

+++  $P < 0.001$ , ++ $P < 0.01$  and + $P < 0.05$ . Normal vs all group vs all groups



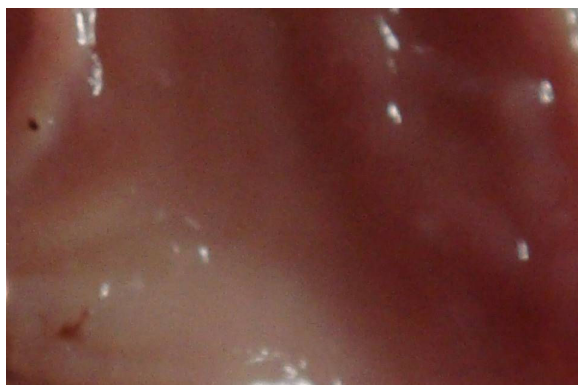
**NORMAL**

**Figure 1**



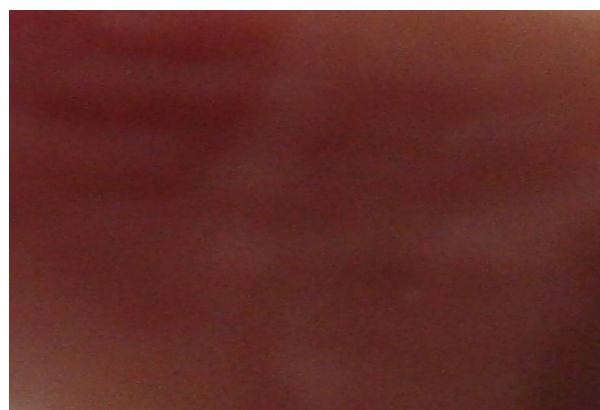
**CONTRO ETHANOL ALONE TREATED**

**Figure 2**



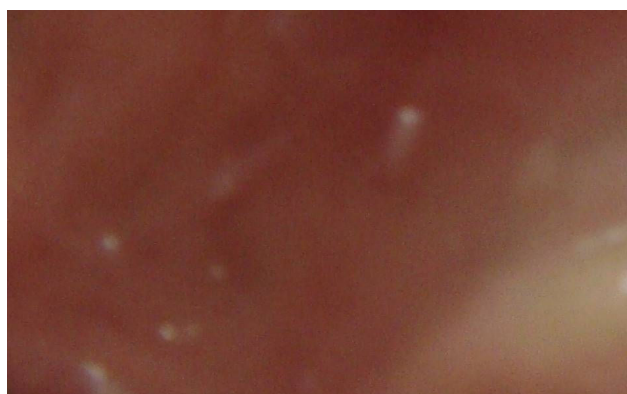
ETHANOL 250mg/kg

Figure 3



ETHANOL 500mg/kg

Figure 4



RANITIDINE

Figure -5

**Indomethacin-induced ulcer model:** The rat pretreated with EEMP produced dose dependent significant ( $P < 0.01$ ) decrease in ulcer index, gastric volume. And EEMP also significantly ( $P < 0.01$ ) increased pH when compared with control group. Ranitidine also showed similar effects. (see Table no:2 and Fig 6-9).

**TABLE 2: EFFECT OF EEMP ON GASTRIC ACID SECRETION AND ULCER SCORE IN INDOMETHACIN INDUCED ULCER MODEL.**

Group	No of ulcer	%inhibition	Gastric volume (ml/100 g body weight)	Gastric pH
Normal (Saline)	00	--	2.94±0.08	3.41±0.7
Control (Indomethacin)	6±0.87	0	5.22±0.10	2.02 ± 0.09
Ranitidine	0	100	3.15±0.18***	3.7±0.15***
EEMP 250mg/kg	2±0.41	33.33	3.8±0.12**	2.71±0.11**
EEMP 500mg/kg	0	0	3.05±0.08***	3.9±0.12***

Values are Mean ± S.E.M. (n=6); Significance values are

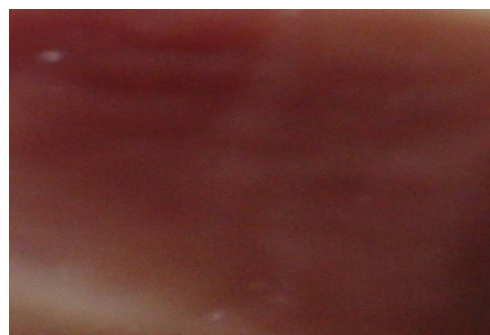
\*\*\* $P < 0.001$ , \*\* $P < 0.01$  and \* $P < 0.05$ . Control group vs all groups

+++  $P < 0.001$ , ++ $P < 0.01$  and + $P < 0.05$ . Normal vs all group vs all groups



CONTROL INDOMETHACIN ALONE TREATED

**Figure 6**



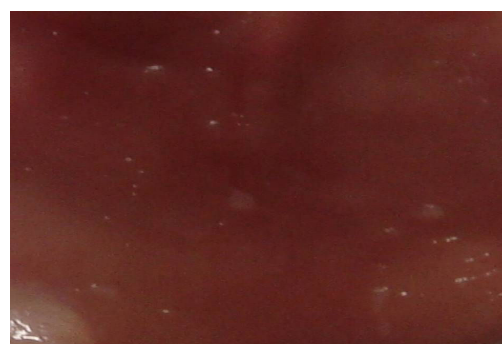
RANITIDINE

**Figure 7**



ETHANOL 250mg/kg

**Figure 8**



ETHANOL 500mg/kg

**Figure 9**



## DISCUSSION

The etiology factors that may induce ulcer in human being are several they are stress, chronic use of anti-inflammatory drugs and continuous alcohol ingestion, spicy food among others.<sup>[9]</sup> In most of the cases, the exact causative factor of ulcer is unknown but it is generally accepted that it is the result of an imbalance between aggressive factors and defensive factors that maintenance mucosal integrity through the several endogenous mechanism.<sup>[10, 11]</sup> The candidate for an effective drug against peptic ulcer should basically act either by reducing the aggressive factors on gastroduodenal mucosa or by increasing mucosal resistance against them. It has become imperative to scrutinize herbal products for evaluating their acclaimed properties, as recently numbers of herbs are being introduced in the market. Keeping this view, we have attempted to study the ethanolic extract of *Mimosa pudica* (EEMP) for its antiulcer activity by using different experimental models of gastric ulcer, ethanol induced ulcer and indomethacin induced ulcer in rats models, which operate by distinct mechanisms of ulcerogenesis.

Oral administration of the damaging agent to the control group clearly produced a mucosal damage characterized by multiple hemorrhage red bands of different sizes along the long axis of the glandular stomach as described in other studies.<sup>[12]</sup> Pretreatment with EEMP (250 and 500 mg/kg) produced significant decrease in the intensity of gastric mucosal damages induced by the necrotizing agent ethanol compared with control group in dose dependent manner. In both studies, the ulcer scores were significantly ( $P < 0.05$ ) decreased in rats pretreated with EEMP which were compared with control group and animals pretreated with extract also decreased gastric acid secretion and there by increased pH when compared to unprotected animals(control group) Cyto-protective action by drugs has been considered to be due to the generation of prostaglandins or blockade of back diffusion of  $H^+$  ions<sup>[13]</sup> will be the major mechanism which is responsible for anti-ulcer activity. The PHF significantly reduced the gastric acid secretion in the present study.

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