EVALUATION OF ANTI-ULCER ACTIVITY OF PAEDERIA FOETIDA ROOT EXTRACTS IN EXPERIMENTALLY INDUCED GASTRIC ULCER IN RATS

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Received on: 12/08/11 Revised on: 20/09/11 Accepted on: 09/10/11

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INTRODUCTION

Paederia foetida Linn., a member of Rubiaceae is an extensive climber, known as Chinese flower in English, Gandhaprasarani in Hindi, Gandha bhadulia in Bengali, Prasrarani in Sanskrit and Savirela in Telugu. It is found in the Himalayas from Dehradun eastwards up to an altitude of 1800m and also in Bihar, Orissa, Bengal, Assam and Araku valley in Visakhapatnam district of Andhra Pradesh. Since the plant was reported to have many medicinal uses, we took up the plant to give scientific support to the folklore claim on the antiulcer activity of roots. The anti ulcer screening was performed using two methods that is pyloric ligation method and aspirin induced ulcerations in rats. Volume of gastric acid, total acidity and the free acidity were also measured to assess the anti ulcer potential. The present investigation therefore expressed that the roots of P. foetida exerts anti-ulcer activity which may be due to anticipated inhibition of H2 receptors resulting in inhibition of gastric acid secretion elicited by histamine and gastrin. The work justifies its use in the traditional system of medicine.

Key words: Paederia foetida, pyloric ligation method, Aspirin induced ulcers, Ranitidine, Sucralfate.

MATERIAL AND METHODS

Plant material
Fresh roots (1.5 kg) of P. foetida was collected from young matured plants from the Pakala region, Warangal district during early summer and authenticated by Prof. V. S. Raju, Taxonomist, Department of Botany, Kakatiya University, Warangal, A.P., India and a voucher specimen (KSR/11/2008) was deposited in the Department of Pharmaceutical Sciences, Andhra University, Visakhapatnam, Andhra Pradesh, India. The material was dried and powdered.

Preparation of the extract
The powdered plant material (380 g) of P. foetida was extracted separately with 2 liters of distilled water and ethanol by maceration process for 72 h. The solvents were then removed under reduced pressure and dried in desiccators [aqueous extract (designated as AEPF) yield 9.78%w/w and ethanolic extract (designated as EEPF) yield 2.97%w/w respect to dry material]. The extracts were suspended in Tween 20 (20%v/v in distilled water) and used for the present study.

EXPERIMENTALLY INDUCED GASTRIC ULCER IN RATS

Adult Wistar albino rats of either sex weighing between 170-200 g were used for the study. The animals were housed in standard acrylic cages at room temperature for 48 h for acclimatization. They were fasted 24 h prior to commencement of the experimental procedure. The animals were deprived of food and water during the experimental period. The protocols were approved by Institutional animal ethical committee of Vaagdevi College of pharmacy.
Hanamkonda, Andhra Pradesh, India vide approval No. 1047/AC/09/CPCSEA.

Anti-ulcer activity of *P. foetida*

The antiulcer activity of the aqueous and ethanolic extract of *P. foetida* was evaluated on selected albino rats by pyloric ligated ulceration model and aspirin induced ulceration model respectively.

Pyloric ligated ulceration

The selected animals were divided into four groups of six in each. Each group of the animals received one of the following test samples through oral route: 20% w/v tween 20 in distilled water (2 ml/kg), ranitidine (20 mg/kg), aqueous extract (200 mg/kg), ethanolic extract (200 mg/kg) respectively. After one hour, pylorus ligation was made as per the procedure. The abdomen of each animal was opened and the stomach was isolated after suturing the lower esophageal end. The gastric juice was collected by giving a small cut to the pyloric region just above the knot in a measuring cylinder and stomach was opened along the greater curvature and stomach was opened along the greater curvature. The mucosal layer was washed with 1 ml distilled water and the washings were added to the gastric secretions. The gastric contents were centrifuged at 2000 rpm for 10 min. The supernatant fluid (1 ml) was diluted with 9 ml of distilled water and then titrated against 0.01N sodium hydroxide solution using Töpler's reagent till the solution turns to orange colour. The volume of sodium hydroxide required corresponds to free acidity. The solution was further titrated till the solution regained pink colour. The volume of sodium hydroxide required corresponded to the total acidity.

The internal lining of the stomach of each rat was then examined carefully for characterizing severity of ulcers. The ulcers were graded as follows, 0 = Normal coloured stomach, 0.5 = Red colouration, 1 = Spot ulcers, 1.5 = Haemorrhagic streaks, 2 = Ulcers ≥ 3 but ≤ 5, 3 = Ulcers > 5.

Aspirin induced ulceration

The selected animals were divided into four groups of six in each. Each group of animals received the test samples as earlier through oral route. Sucralfate (25 mg/kg) was used as reference standard. After 30 min, each animal was administered 200 mg/kg aspirin through oral route. After 1 hr, pylorus ligation was made as per the procedure. The animals were sacrificed after 4 hr, the stomachs were opened along the greater curvature and carefully observed for severity of ulceration as described earlier.

The results were depicted in Tab. No. 2.

**Statistical analysis**

The mean ulcer score of each animal was expressed as ulcer index. The results were expressed as mean ± S.E.M and tabulated in Table-1. Significance of differences between control and treated groups was determined using Student's *t*-test.

**RESULTS AND DISCUSSION**

The findings of the study revealed that the root extracts possess significant anti-ulcer activity. In pyloric ligated ulceration (Shay model), all the test samples were found to reduce the volume of gastric acid to a significant extent (p < 0.01), (Fig. No.1) where as ranitidine reduced the volume to the extent of p<0.001. The total acidity and the free acidity also registered significant decrease in a similar manner, (Fig. No. 2 & 3). The ulcer index was significantly reduced with all test samples (Fig. No.4, 5) the order of reduction of ulcer score observed was ranitidine < ethanol extract < aqueous extract.

In aspirin induced ulceration model, the extracts reduced the ulcer index significantly, but the stomach mucosal layer was found to be normal. (Fig 6, 7) The available literature information on possible mechanisms of action of sucralfate reveals that it accelerates ulcer healing by forming ulcer adherent complex with proteinaceous exudates, as a result of which peptic activity is inhibited, where as H₂ antagonists protect experimental animals from gastric ulceration induced by stress, pyloric ligation, aspirin, H₂ receptor agonists or cholinomimetics.

**CONCLUSION**

The present investigation therefore expressed that the roots of *P. foetida* exerts anti-ulcer activity which may be due to anticipated inhibition of H₂ receptors resulting in inhibition of gastric acid secretion elicited by histamine and gastrin. The work justifies its use in the traditional system of medicine.

**REFERENCES**


Table 1: Anti-ulcer activity of the aqueous and ethanolic extract of *P. foetida* on pyloric ligated rats.

<table>
<thead>
<tr>
<th>Group</th>
<th>Treatment</th>
<th>Volume of gastric juice (ml)</th>
<th>Total acidity (meq/lit)</th>
<th>Free acidity (meq/lit)</th>
<th>Ulcer index</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Vehicle (20% w/v Tween 20)</td>
<td>2 ml/kg</td>
<td>4.21 ± 0.16</td>
<td>16.43 ± 0.33</td>
<td>3.05 ± 0.09</td>
</tr>
<tr>
<td>II</td>
<td>Ranitidine</td>
<td>20 mg/kg</td>
<td>2.03 ± 0.18**</td>
<td>6.52 ± 0.22**</td>
<td>0.52 ± 0.03**</td>
</tr>
<tr>
<td>III</td>
<td>Aqueous extract of <em>P. foetida</em> (AQPF)</td>
<td>200 mg/kg</td>
<td>3.56 ± 0.17**</td>
<td>12.26 ± 0.29**</td>
<td>1.3 ± 0.14**</td>
</tr>
<tr>
<td>IV</td>
<td>Ethanolic extract of <em>P. foetida</em> (EEP)</td>
<td>200 mg/kg</td>
<td>3.38 ± 0.23*</td>
<td>10.08 ± 0.49**</td>
<td>0.90 ± 0.04**</td>
</tr>
</tbody>
</table>

Results expressed as Mean ± SEM from six observations

* P < 0.01, ** P < 0.001
Table No. 2 Anti-ulcer activity of the aqueous and ethanolic extract of *P. foetida* in Aspirin induced ulcers

<table>
<thead>
<tr>
<th>Group</th>
<th>Treatment</th>
<th>Dose</th>
<th>Ulcer index</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Vehicle (20%/v/v Tween 20)</td>
<td>2 ml/kg</td>
<td>4.55±0.17</td>
</tr>
<tr>
<td>II</td>
<td>Sucralfate</td>
<td>25 mg/kg</td>
<td>0.38±0.25**</td>
</tr>
<tr>
<td>III</td>
<td>Aqueous extract of <em>P. foetida</em></td>
<td>200 mg/kg</td>
<td>1.99±0.49*</td>
</tr>
<tr>
<td>IV</td>
<td>Ethanolic extract of <em>P. foetida</em></td>
<td>200 mg/kg</td>
<td>1.67±0.20**</td>
</tr>
</tbody>
</table>

Results expressed as Mean ± SEM from six observations

* P < 0.01, ** P < 0.001

Fig. No. 1 Effect of *P. foetida* on Volume of gastric juice

Fig. No. 2 Effect of *P. foetida* on Total acidity

Fig. No. 3 Effect of *P. foetida* on free acidity

Fig. No. 4 Ulcer index of *P. foetida* in pyloric ligated rats
Fig. No. 5 Anti-ulcer activity of the aqueous and ethanolic extract of *P. foetida* on pyloric ligated rats

Fig. No. 6 Ulcer index of *P. foetida* in aspirin induced ulcers

Fig. No. 7 Anti-ulcer activity of the aqueous and ethanolic extract of *P. foetida* in Aspirin induced ulcers

Source of support: Nil, Conflict of interest: None Declared