

Research Article

Evaluation of Anti-Ulcer Activity of Hydroalcoholic Stem Bark Extract of *Garuga pinnata* Roxb.

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ABSTRACT

The attempt was to study about anti-ulcer activity of hydroalcoholic stem bark extract of *Garuga pinnata*. The plant was already shown the astringent, stomachic, expectorant, antitumor and antidiabetic activities. The phytochemical studies were shown that the extract contains carbohydrates, flavonoids, saponins, steroids, triterpenoids, and tannins. The animal model used here was pylorus ligation model. In this model ulcer index was studied in comparison with control and standard Cimetidine. In pylorus ligation model other parameters like changes of pH, gastric volume and acidity were studied. Hydroalcoholic stem bark extract of *Garuga Pinnata* was used in two doses 200mg/kg and 400mg/kg to study anti-ulcer activity. Different methods are having different kinds of mechanism for inducing ulcer in rats. In pylorus ligation the ulcer is due to the excess secretion of acids and lower pH level. The hydroalcoholic stem bark extract of *Garuga pinnata* shown a significant antiulcer activity. The hydroalcoholic stem bark extract of *Garuga pinnata* at dose of 400mg/kg was slight better than dose of 200mg/kg. The studies shown that hydroalcoholic stem bark extract of *Garuga pinnata* was having a remarkable antiulcer activity.

Key words: *Garuga pinnata*, hydroalcoholic stem bark extract, pylorus ligation, Anti-ulcer activity

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INTRODUCTION

Ulcers are sores or open wounds that occur on the skin or along the lining of the digestive tract due to loss of tissue. Earlier it was believed that one developed these types of sores due to stress and spicy food. The causative agent is infection caused by the bacteria *H. pylori* or reaction to certain medicines like non-steroidal anti-inflammatory drugs (NSAIDs). The symptoms include abdominal discomfort and pain 2-3 hours after one has taken a meal or when on empty stomach. Other symptoms include weight loss, poor appetite, bloating, nausea, and vomiting. Some may also experience blood in stool and vomit, and black stools that indicate gastrointestinal bleeding [1]. *Garuga pinnata* Roxb. (Family- Burseraceae), a deciduous tree reaching 50 feet in height, with bark peeling off in flakes is inhabited in hilly areas and semi evergreen forests of Bangladesh, India, Malaysia and the Philippines [2]. Stem contain amento flavone. Stem bark extract gave positive tests for steroids, terpenes, alkaloids, flavonoids and saponins. An euphane triterpene alcohol has been isolated from this plant [3]. The leaves of this plant are found to be having noticeable amount of phenolic compounds, which may involve in controlling various oxidative and reductive processes. The fruits are stomachic and expectorant; given in diarrhoea whereas, the stem juice is commonly used as eye drops to cure opacities of the conjunctiva [4, 5]. Fruits are Cooling, Digestive, Decoction of Roots is used in Pulmonary diseases. The present study was designed to investigate the anti-ulcer activity of hydroalcoholic stem bark extract of *Garuga pinnata* Roxb. in an acute animal model of peptic ulcer.

Plant Material

The stem barks of the plant *Garuga pinnata* Roxb. were obtained identified and authenticated internally by Dr. Vijay Kumar, Scientist, Ethnopharmacology and Pharmacognosy division and were deposited in the departmental herbarium of National Botanical Research Institute, Lucknow, India for future reference. The collected stem bark were dried in shade, crushed to coarse powder and used for further studies.

Preparation of hydroalcoholic stem bark extract of *Garuga pinnata* Roxb.

The stem bark of *Garuga pinnata* Roxb. was collected, dried in the shade, powdered, and weighed (1 kg). The powdered plant material was exhaustively extracted with mixture of methanol and distilled water (50% v/v) in the cold for 3 days. The extract was separated by filtration and concentrated on rotavapour (Buchi, USA) and then dried in freezone / freeze dry system 4.5 at high vacuum and at temperature -40°C (yield 9.65% w/w). The extracts were subjected to phytochemical and pharmacological investigations.

Preliminary phytochemical studies

The hydroalcoholic stem bark extract of *Garuga pinnata* Roxb. was subjected to preliminary phytochemical screening in order to see the presence of Alkaloids, Triterpenoids, Tannins and Flavonoids, Saponins [6].

Animals

Male Wistar rats, weighing 200-250 g were procured from the central animal house of Central Drug Research Institute Lucknow, India. The animals were kept in the departmental animal house in polyacrylic cages with not more than six

animals per cage and maintained under standard laboratory conditions at 26 ± 2 °C and relative humidity 44 – 56%, light and dark cycle of 10 and 14 hrs respectively for 1 week before and during the experiment for acclimatization. The animals were provided with standard rodent pellet diet (Amrut, India) and the food was withdrawn 18-24 hr before the experiment though water was allowed *ad libitum*. All experiments were performed in the morning according to current guidelines for the care of laboratory animals and the ethical guidelines for investigations of experimental pain in conscious animals [7].

Model used for antiulcer activity

Pylorus Ligation Induced Ulcer

Gastric ulcers were produced in rats by following method [8]. Briefly, the rats were fasted for 24 h before pylorus-ligation but water was allowed *ad libitum*. At the end of 24 h starvation, rats were anaesthetized with pentobarbitone sodium (35 mg/kg). Abdomen was opened by a midline incision and a ligature was placed at the pyloric end of the stomach taking care not to exclude any blood vessels. The abdomen was then closed in two layer and rats were left in a cage with a false bottom of wide mesh wire gauze to prevent coprophagy. Water was withheld from one hour before pylorus ligation and till the end of 4 h period when the rats were sacrificed by overdosing with ether. Immediately afterwards abdomen was again opened, cardiac end of stomach was ligated and the stomach was taken out. The stomach was then cut open along the greater curvature and the mucosa was washed under slow running tap water. The total severity of the ulcers was determined by recording the severity of each ulcer after histological confirmation as follows:

0, no ulcer;

+, pin point ulcer and histological changes limited to superficial layers of mucosa and no congestion;

++, ulcer size less than 1 mm and half of the mucosal thickness showed necrotic changes;

+++, ulcer size 1-2 mm with more than two thirds of the mucosal thickness destroyed with marked necrosis and congestion, muscular is remaining unaffected;

++++, ulcer either more than 2 mm in size or perforated with complete destruction of the mucosa with necrosis and hemorrhage, muscular is still remaining unaffected. The pooled group ulcer score was then calculated [9].

Statistical analysis

Data are expressed as mean \pm SEM (standard error of mean) for six rats. The difference among mean has been analyzed by unpaired student t-test (Newman- Keuls Multiple Comparison Test) [10].

RESULTS

The hydroalcoholic stem bark extract of *Garuga pinnata* Roxb. was noted on gastric secretion in the pylorus ligation model. The gastric fluid volume was observed 1.65 ± 0.01 mL and 2.11 ± 0.12 after administration of hydroalcoholic stem bark extract of *Garuga pinnata* Roxb. at a dose of 200 and 400 mg/kg. The acidity of gastric secretion was found to be 94.67 ± 1.39 and 76.6 ± 1.53 meq/l. respectively. Treatment of hydro-alcoholic stem bark extract of *Garuga pinnata* Roxb. significantly reduce the ulcer index to 24.50 ± 2.11 and 13.50 ± 1.33 at a dose of 200 and 400 mg/kg respectively, as compared with control as shown in table 1.

Table 1: Effect of hydroalcoholic stem bark extract of *Garuga pinnata* Roxb. on Ulcer index, Gastric pH, Gastric volume and Acidity in pylorus ligation- induced gastric ulcer

Groups	Treatments	Dose (mg/Kg)	Ulcer index	Percent protection	Gastric pH	Gastric volume	Acidity
I	Pylorus ligation	-	25.33 ± 0.88	-	1.33 ± 0.03	1.34 ± 0.04	134.0 ± 1.98
II	<i>Garuga pinnata</i> extract	200	24.50 ± 2.11	3.27	1.61 ± 0.02	1.65 ± 0.01	94.67 ± 1.39
III	<i>Garuga pinnata</i> extract	400	13.50 ± 1.33	46.70	1.90 ± 0.02	2.11 ± 0.12	76.6 ± 1.53
IV	Cimetidine	100	7.61 ± 2.49	69.96	0.07 ± 0.09	2.07 ± 1.34	30.83 ± 1.05

Values are expressed as mean ± SEM of 6 rats in each group. $p < 0.001$ when compared to respective control.

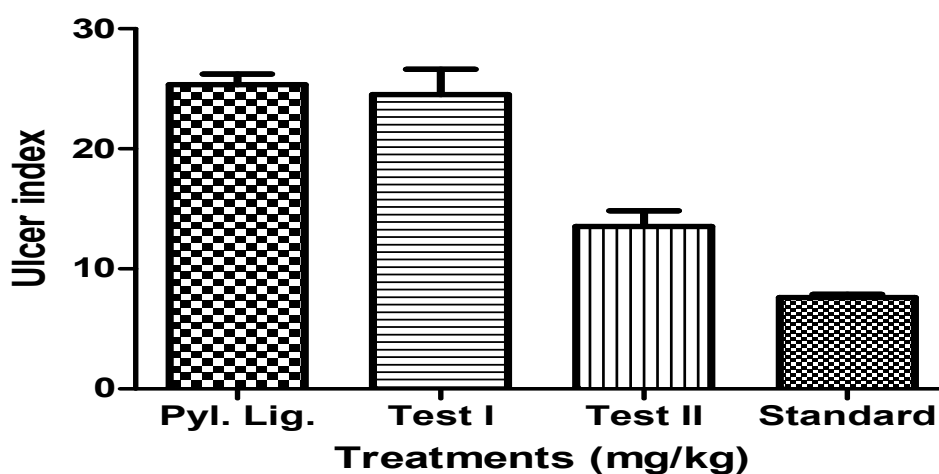


Fig 1. Effect hydroalcoholic stem bark extract of *Garuga pinnata* Roxb. on ulcer index in pylorus ligation induced gastric ulcer. (Pyl. Lig.- Pylorus Ligation, Test I- *Garuga pinnata* extract (200mg/kg), Test II- *Garuga pinnata* extract (400mg/kg), Standard-Cimetidine (100mg/kg))

DISCUSSION

Peptic ulcer and gastritis have been associated with multi pathogenic factors and could be due to disturbances in natural balances between the aggressive factors (e.g. of acid, bicarbonate, pepsin) and maintenance of the mucosal integrity through the endogenous defense mechanism (e.g. of defensive mechanisms of mucus, mucosal turnover and blood supply (mucosal barrier) [11, 12]. Generally various non-specific methods are used to restore these imbalances including regular food intake, adequate rest and avoidance of ulcerogenic agents (e.g. tobacco, alcohol and coffee). Their aims are to attenuate and possibly block the gastric acid secretion or to enhance the mucosal defense mechanisms [13]. Due to the reported side effects of available antiulcer drugs, focused have been shifted towards natural products as the new sources of antiulcer agents. The present study indicated that hydroalcoholic stem bark extract of *Garuga pinnata* Roxb. showed ulcer protective effects against pylorus ligation induced gastric ulcers in rats. Pylorus ligation-induced ulcers are thought to be caused due to increased presence of acid and pepsin in the stomach. Hydroalcoholic stem bark extract of *Garuga pinnata* Roxb. tended to decrease the acid and pepsin secretion in the stomach.

CONCLUSION

In conclusion, the pharmacological studies provided the data of hydroalcoholic stem bark extract of *Garuga Pinnata* Roxb. will help in identifying and differentiating from other species. The presence of a variety of medicinally active chemical substances such as carbohydrates, flavonoids, saponins, steroids, triterpenoids, and tannins in *Garuga pinnata* Roxb. plant give a lead for further studies to identify and isolate particular

components responsible for its medicinal activity. Thus our study give scientific support to the traditional uses of the plant as claimed in folklore medicine.

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