RESEARCH PAPER

Accepted 4 April 2005
Revised 25 September 2004
Received 27 April 2004
Indian J. Pharm. Sci., 2005, 67(2):165-168

Antiulcer Activity of Methanol Extract of *Eclipta alba*

A. BANERJEE, N. SHRIVASTAVA, A. KOTHARI, H. PADH AND M. NIVSARKAR*
Department of Pharmacology and Toxicology, B.V. Patel PERD Centre, Thaltej, Gandhinagar Highway, Thaltej, Ahmedabad-382 054

Ulcers were induced in thirty six hours fasted Sprague Dawley rats by aspirin or ethanol or pylorus ligation plus aspirin treatment. In each induction procedure there were three groups namely, normal control, positive control and test. In all the three separate experiments the group receiving oral administration of *E. alba* prior to ulcer induction showed highly significant reduction in the occurrence of gastric ulcers as well as gastric inflammation (after 4 h of treatment) as compared to the control groups. Moreover, the potency of *E. alba* as an antiulcer agent was comparable to the activity of the proton pump inhibiting drug rabeprazole (positive control). These results emphasize on the need to diversify into alternative therapeutic approaches pertaining to herbal medicine wherein a single easily available plant may provide answers to several therapeutic challenges as observed in the anti ulcer activity shown by methanol extract of *E. alba*.

Peptic ulcer is an inflamed break in the lining of the stomach or the duodenum caused due to either increased acid production or damage to the mucus lining of the stomach. In most conditions the event of peptic ulcer is due to an imbalance taking place because of increased hydrochloric acid secretion and decreased cytoprotective activity of the mucosal barrier[1]. Most synthetic drugs used to treat peptic ulcers act as a proton pump inhibitor or a H_2 receptor antagonist. Thus, they target the acid secretion mechanism of ulcer induction[2]. These synthetic drugs are not only highly complex, expensive and with side effects but, also act on a single cause of the disease. Hence, there exists a need to devote more research on finding a better preventive as well as curative agent that targets more than one if not all the initiating factors for peptic ulcers.

Classical texts of herbal medicine provide a wide range of alternative therapeutic possibilities that have been used since ages, which are very easily available and are much cheaper[3]. Moreover, manifestation of side effects is minimum during the use of herbal therapies. This may be due to the multi protective functions of the different active components present in a single plant. Thus, a side effect caused due to a particular activity of a plant will be counteracted by its other active moieties resulting into minimum or no toxic manifestation. In the light of these benefits, use of herbal extracts/formulations has recently gained more popularity as therapeutic tools. Thus, further work in recognizing plant based therapy of peptic ulcers is an important line of research.

Eclipta alba is a herb commonly prevalent throughout India in most wet or moist waste lands[4]. Pharmacologically the alcoholic extract of the plant shows protective effect on experimental liver damage in rats and mice[5-7] and the antihepatotoxic activity of its active component wedelolactone is also well established[8]. Moreover, the plant extracts have also shown antimyotoxic, antihaemorrhagic[9], antiviral[10], antinociceptive, antiinflammatory, bronchodialatory[11] as well as antibacterial[12] activities. These studies indicate that this plant has several widespread beneficial effects. In this paper, the anti ulcer property of the methanol extract of *Eclipta alba* has been evaluated in various ulcer models in animals.

***For correspondence:**
E-mail: perd@wilnetonline.net
manishnivsarkar@yahoo.com

MATERIALS AND METHOD

Sprague Dawley male rats (n=27) weighing 185±6 g of either sex bred in the animal house colony at the B.V. Patel PERD Centre, Ahmedabad, from the original stock obtained from National Institute of Nutrition were used for the study. Nine animals were used in each of the ulcer models. Each model had three groups namely normal control, positive control and test, three animals per group were used for the study. The animals were housed 3 per cage in polypropylene cages and were moved to the experimental room where they were allowed to acclimatize for a day before treatment. The environmental conditions of the animal room were as per a specific design. A 10% air exhaust in the air conditioning unit was maintained along with a relative humidity of 60±5% and a temperature of 25±3° was stabilized. A 12 h light/dark cycle was also regulated for the experimental animals. Amrut certified rodent diet (Maharashtra Chakan Oil Mills Ltd.) and tap water (boiled water cooled to room temperature) was provided *ad libitum* to the animals. All experimental protocols were reviewed and accepted by the Institutional Animal Ethics Committee (IAEC) prior to the initiation of the experiment. Aspirin used in the experiment was obtained from Lancaster, England and Rabeprazole was a gift sample from Cadila Pharmaceuticals Ltd., Ahmedabad.

Preparation of plant extract:

Whole plants of *Eclipta alba* in flowering stage were collected during November-December from their natural habitat in and around Ahmedabad. They were shade dried and finely (80 mesh) powdered in a grinder. The methanol extract was prepared by cold maceration method (1:5, plant powder: solvent x 3). The extract was evaporated to dryness using water bath (60-70°). The extract obtained was stored in a labeled, airtight, amber coloured bottle in the refrigerator until use.

Ulcer induction procedure:

Gastric ulcers were induced in the experimental animals using three models, aspirin-induced (500 mg/kg by gavage), ethanol-induced (1 ml/animal p.o.) and pylorus ligation plus aspirin-induced (500 mg/kg by gavage). All the animals were fasted for 36 h prior to dosing. The control animals were administered with the calculated dose of 0.2% agar (500 mg/kg), the positive control group was dosed with rabeprazole (500 mg/kg in 0.2% agar) and the test group was dosed with the test extract (500 mg/kg in 0.2% agar) at least 30 min prior to the procedures to be carried out for ulcer induction. Throughout the experiments water was provided *ad libitum* and food was withdrawn from the animals.

Stomachs from rats were removed and cut along the greater curvature and washed in normal saline. The mucosal layer of the stomach was observed under a magnifying lens and was checked for ulcers, hemorrhagic areas or perforations. The ulcer index[13] was determined as described below: ulcer index=10/x, where, x is the total area of stomach mucosa/total ulcerated area. After scoring, the stomach samples were preserved in 10% formalin for histopathological examination.

Aspirin-induced gastric ulcers[14]:

The rats were gavaged with aspirin suspended in 0.2% agar (500 mg/kg). The animals were then left as such for 4 h after which they were sacrificed, their intact stomachs were removed, scored and preserved as above.

Ethanol-induced gastric ulcers[15]:

Rats were orally dosed with 1 ml of 80% ethanol and then were left as such for 4 h. The animals were then sacrificed and their intact stomachs were removed, observed, scored and preserved as described earlier.

Pylorus ligation plus aspirin-induced gastric ulcers[14]:

The rats were subjected to pylorus ligation under ether anesthesia and gavaged with aspirin suspended in 0.2% agar (500 mg/kg body weight). They were sacrificed after 4 h post surgery and their intact stomachs were excised, observed, scored and preserved as mentioned above. Histopathological examination was carried out for stomach tissue samples fixed in 10% formalin, slides were stained with haematoxylin and eosin and photographed under microscope.

RESULTS AND DISCUSSION

The results presented in figs.1, 2 and 3 indicate that in all three models of ulcer induction the animals in the control group showed significant gastric ulceration. In aspirin-induced gastric ulcer the methanol extract of *E. alba* showed significant reduction in gastric inflammation and with almost negligible presence of ulcerative damage to the gastric mucosal lining after 4 h of treatment with aspirin (fig. 1). The Ulcer index was observed to be almost as low as that obtained in the positive control group that received rabeprazole.

Inhibition in gastric ulceration brought about by the

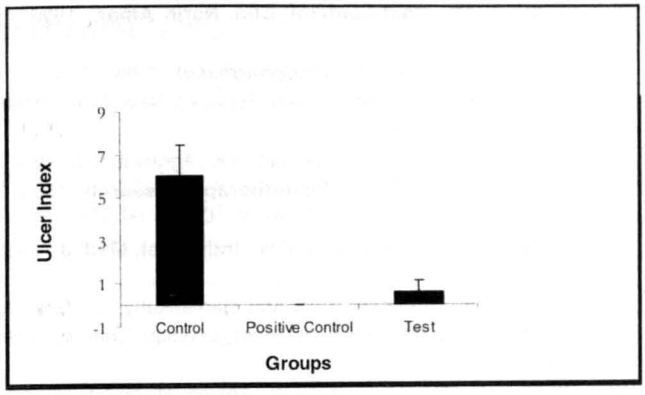

Fig. 1: Ulcer index in different group of aspirin-induced gastric ulcer model.

Figure shows the ulcer index in control, positive control and test groups of animals in aspirin-induced model of gastric ulcer. The test group has a considerably low ulcer index as compared to the normal control.

Eclipta alba extract was more pronounced in the ethanol-induced model (fig. 2), wherein, the ulcer index of the test group is almost ten times lower than that of the positive control.

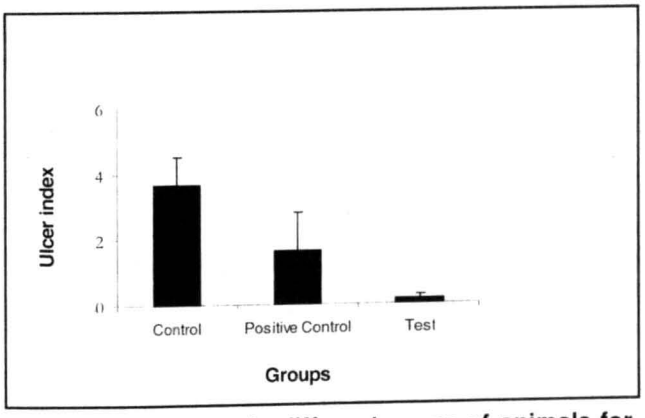

Fig. 2: Ulcer index in different group of animals for ethanol-induced gastric ulcer model.

Figure shows the ulcer index in control, positive control and test groups of animals in ethanol-induced model of gastric ulcer. The test group shows very low values as compared to the normal control as well as the positive control.

In the third pylorous ligation plus aspirin-induced model the reduction in ulcer index observed in the test group as compared to the control group is almost similar to the results obtained in the aspirin-induced model and the test extract demonstrated a drastic reduction in ulcer index (fig.

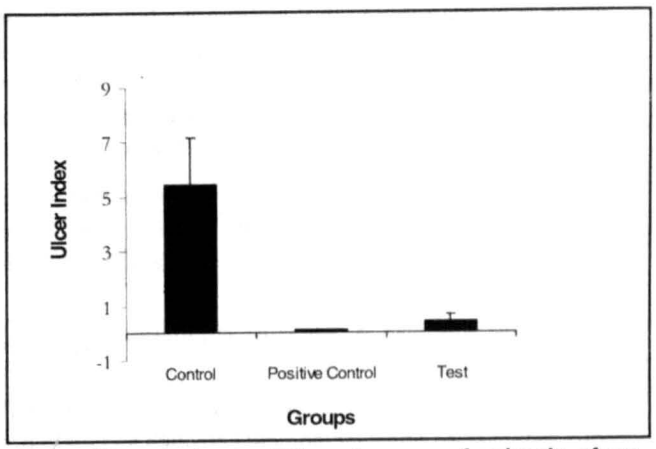

Fig. 3: Ulcer index in different group of animals of pylorus ligation plus aspirin-induced gastric ulcer model.

Figure shows the ulcer index in control, positive control and test groups of animals in pylorus ligation plus aspirin-induced model of gastric ulcer. The ulcer index of the test group is much less when compared to the normal control.

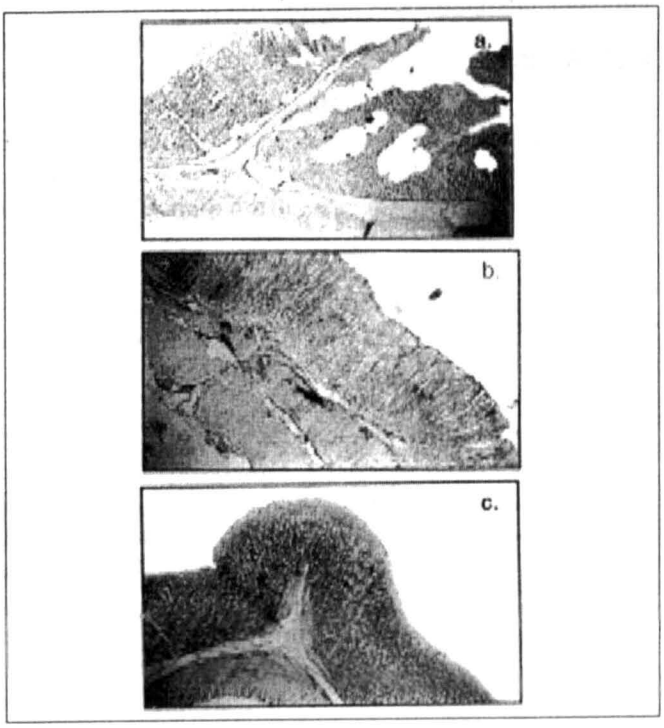

Fig. 4: Histopathological evaluation of ulcerative stomachs

Photomicrographs showing ulcerative stomach (fig.4a; control) and protection with rabeprazole (fig. 4b; positive control) and test extract (fig. 4c). Magnification 57 X.

3), which is comparable to the gastroprotective effect seen in the positive control group. Fig. 4 shows results from histopathological evaluation. Histopathology also revealed similar results where good protection was seen with the test extract and positive control in all the three models.

Hence, in the entire three ulcer inducing experimental models the methanol extract of *Eclipta alba* showed a highly significant protection of the gastric mucosa against different ulcer causing agents.

The methanol extract of the whole plant of *Eclipta alba* has shown an immense potential as an anti ulcer agent in different ulcer models in animals. Thus, in addition to its various established pharmacological activities its gastro protective activity also holds great therapeutic potential and hence merits further investigation to understand its exact mechanism of action.

ACKNOWLEDGEMENTS

Authors are thankful to the Industries Commissionarate of Gujarat State, India for financial support towards the instrumentation facilities.

REFERENCES

1. Piper, D.W. and Stiel, D.D., **Med. Prog.,** 1986, 2, 7.
2. Freston, J.W., **Gastroenterol. Clin. North Amer.**, 1990, 19, 121.
3. Marini-Bettolo, G.B., **J. Ethnopharmacol.**, 1980, 2, 5.
4. Indian Herbal Pharmacopoeia, Revised New Edn., IDMA, Mumbai, 2002, 196.
5. Singh, B., Saxena, A.K., Chandan, B.K., Agrawal, S.G., Bhatia, M.S. and Anand, K.K., **Phytotherapy Research**, 1993, 7, 154.
6. Pandey, G.P. and Srivastava, D.N., **Indian Vet. Med. J.**, 1993, 17, 14.
7. Warrier, P.K., Nambiar, V.P.K and Ramankutty, C., Eds., In; Indian Medicinal Plants, Vol. 2, Orient Longman, Chennai, 1994, 350.
8. Wagner, H., Geyer, B., Kiso, Y., Hikino, H. and Rao, G.S., **Planta Med.**, 1986, 5, 370.
9. Paulo, M.A., Maria, C.N., Walter, M.B. and Guillerme, S., **Toxicon**, 1994, 42, 595.
10. Mi, Z., Chen, H. and Zhang, X., **Zhongguo Zhong Yao Za Zhi (China)**, 1997, 22, 43.
11. Abdel-Kader, M.S., Bahler, B.D. and Malone, S., **J. Nat. Prod.**, 2000, 63, 1184.
12. Phadke, S.A. and Kulkarni, S.D., **Indian J. Med. Sci.**, 1989, 43, 119.
13. Rainsford, K.D., **Trends Pharmacol. Sci.**, 1984, 5, 156.
14. Dhuley, J.N., **Indian J. Pharmacol.**, 1999, 31, 128.
15. Goswami, S., Patel, Y., Santani, D.D. and Jain, S., **Indian J. Pharmacol.**, 1998, 30, 379.