



ANTI PEPTIC ULCER ACTIVITY OF THE LEAVES OF *Amaranthus spinosus* L. IN RATS

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ABSTRACT

Anti peptic ulcer activity of the leaves of *Amaranthus spinosus* L., a plant of Eastern Himalaya, was studied in peptic ulcer models in rats. Gastric and duodenal ulcers were induced by ethanol and cysteamine respectively. Results were compared with omeprazole, a known drug for peptic ulcer. It was found out that the leaves of *Amaranthus spinosus* L. exerted anti peptic ulcer activity against ethanol and cysteamine induced peptic ulcerations but the activity was less than that of omeprazole.

Keywords: *Amaranthus spinosus* L., peptic ulcer, ethanol, cysteamine, omeprazole.

INTRODUCTION

Amaranthus spinosus L., a medicinal plant under the family of amaranthaceae, is distributed in lower to middle hills (3000–5000 ft) of entire north eastern Himalayas. The plant grows in cultivated areas as well as in waste places. Leaves of *Amaranthus spinosus* L. are stacked and alternate. The plant is known as “prickly amaranthus” in English and “ban lure” or “dhuti ghans” in Nepali. Medicinal uses of *Amaranthus spinosus* L. as mentioned in Ayurvedic text [1] are: Leaf infusion is diuretic and used in anemia. Root paste is used in gonorrhoea, eczema, menorrhoea etc. Ethnic use of this plant is mainly with village people of Sikkim who use leaf infusion of *Amaranthus spinosus* L. in stomach disorder especially in case of indigestion and peptic ulcer [2].

Tempted on the ethnic use of *Amaranthus spinosus* L. it was thought worthwhile to evaluate scientifically the anti peptic ulcer activity of the leaves of the plant in ethanol induced gastric ulcer as well as cysteamine induced duodenal ulcer models in albino rats.

MATERIALS AND METHODS

Experimental animals

Wistar strain albino rats (180 - 200 g) of either sex were used for the study. Rats were housed in colony cages (5 rats / cage) and were kept for at least a week in the experimental wing of the animal house (room temperature 25 – 28 degree centigrade and humidity 60 – 65% with 12 h light and dark cycle) before experimentation. Animals were fed on laboratory diet with water *ad libitum*. 10 rats were used for each set of experiment. The animal experiment was approved by the ethics committee of the Institute.

Chemicals and drugs

Ethanol (Baroda Chemical industries Ltd., Dabhoi), cysteamine (Sigma Chemical Co., USA) and omeprazole (Kopran Pharma Ltd. Mumbai) were used in the study.

Preparation of the test drug

Leaves of *Amaranthus spinosus* L. were collected from the medicinal plant garden of the University of North Bengal and identified by the experts of the department of Botany. A voucher specimen of the leaf was kept in the department for future references.

Leaves were shade dried and powdered. This powder was used as test drug.

Production of peptic ulcer

Ethanol induced gastric ulcer

This was done by the method of Sairam et al.[3] Rats were fasted for 18 h when no food but water was supplied *ad libitum*. Gastric ulcers were induced by administering ethanol (95%, 1 mL/200 g body weight) orally. 1 h after administration of ethanol, animals were sacrificed by cervical dislocation and the stomach was taken out and incised along the greater curvature. Stomach was then examined for the presence of bleeding, adhesion, dilatations and ulcers.

Cysteamine induced duodenal ulcer

This was done by the method of Parmar and Desai [4]. To 18 h fasted rats (water was supplied *ad libitum*) cysteamine hydrochloride (400 mg/kg, p.o. in 10% aqueous solution) was administered in two doses at an interval of 4 h to produce duodenal ulcers. After 24 h of the first dose of cysteamine, animals were sacrificed by cervical dislocation and the duodenum was excised carefully and opened along the antimesenteric side. Duodenum was then examined for the presence of ulcers.

Anti ulcer study

Rats were divided into 3 major groups.

1. Drug treated control : In this group either ethanol or cysteamine was given.
2. *Amaranthus spinosus* L. and drug : Powdered leaves of *Amaranthus spinosus* L. was given to the rats orally 30 minutes prior to administration of ethanol and 30 minutes before each dose of cysteamine hydrochloride. *Amaranthus spinosus* L. was used in two doses - 1 g/kg and 2 g/kg.
3. Omeprazole and drug : Omeprazole was given in the dose of 8 mg/kg p.o. 30 minutes prior to administration of ethanol and 30 minutes before each dose of cysteamine hydrochloride. Dose of omeprazole was used as per the method of Malairajan *et al.* [5]

Evaluation of ulcer index

Evaluation of ulcer index was done by the method of Szelenyi and Thieme [6]. Gastric /duodenal lesions were counted and the mean ulcerative index was calculated as follows:

1. Presence of edema, hyperemia and single sub mucosal punctiform hemorrhage.
2. Presence of sub mucosal hemorrhagic lesions with small erosions.

3. Presence of deep ulcer with erosions and invasive lesions.

$$\text{Ulcer index} = (\text{number of lesion I}) \times 1 + (\text{number of lesion II}) \times 2 + (\text{number of lesion III}) \times 3.$$

Statistical analysis

The values were expressed as mean \pm SEM and was analyzed using one-way analysis of variance (ANOVA) using Statistical Package for Social Sciences (SPSS) 20th versions.

Differences between means were tested employing Duncan's multiple comparison tests and significance was set at $p < 0.05$.

RESULTS

Table 1 : Showing effects of leaves of *Amaranthus spinosus* L. and omeprazole against ethanol induced gastric ulcer and cysteamine induced duodenal ulcers in rats.

Group & Dose	Ethanol (1 mL/200 g) Ulcer index (mean \pm SEM)	Cysteamine(400 mg /kg) Ulcer index(mean \pm SEM)
Drug treated control	29.9 \pm 1.43	21.1 \pm 1.15
<i>Amaranthus spinosus</i> L. (1 g / kg)	20.5 \pm 0.88*	11.7 \pm 0.52*
<i>Amaranthus spinosus</i> L. (2 g / kg)	13.7 \pm 0.76*	9.1 \pm 0.33*
Omeprazole (8 mg / kg)	8.4 \pm 0.24*	3.1 \pm 0.23*

Values were mean \pm SEM of 10 animals in each group. * $p < 0.001$ when compared to drug control.

DISCUSSION

Anti ulcer activities of vegetables and herbs were known in literature [7-12]. We also reported the anti ulcer activities of few medicinal plants of Darjeeling and Sikkim Himalayas in different experimental ulcer models [13-16].

Amaranthus spinosus L., a plant of Eastern Himalaya, was known for its ethnic use in peptic ulcer². The present study was thus conducted to evaluate scientifically the anti peptic ulcer activity of the leaves of *Amaranthus spinosus* L. in rats, if any.

As peptic ulcer includes both gastric and duodenal ulcer, gastric and duodenal ulcers were produced in albino rats by administration of ulcerogenic doses of ethanol and cysteamine respectively and effects of the leaves of *Amaranthus spinosus* L. On the ulcer models were studied. For comparison omeprazole was used which is a known drug for peptic ulcer.

Results showed that powdered leaves of *Amaranthus spinosus* L. could protect significantly ($p < 0.001$) the animals from formation of gastric ulcers induced by ethanol and duodenal ulcers induced by cysteamine. The anti peptic ulcer activity of *Amaranthus spinosus* L. Was, however, less than that of omeprazole?

Anti peptic ulcer activity of the leaves of *Amaranthus spinosus* L. is due to the presence of active ingredient(s) in the leaves. It was thus thought worthwhile to isolate and characterize the active ingredient present in the leaves. Work in this direction was undertaken and the results are presented in the subsequent paper.

CONCLUSION

Anti peptic ulcer activity of the leaves of *Amaranthus spinosus* L., a plant of Eastern Himalaya, was studied in peptic ulcer models in rats. Results showed that leaves of *Amaranthus spinosus* L. exerted anti peptic ulcer activity against ethanol and cysteamine induced peptic ulcerations in rats. *Amaranthus spinosus* L. thus provides a scientific rationale for the use as anti peptic ulcer drug.

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Results are shown in Table - 1.

Ethanol produced massive gastric ulcers in all albino rats. Ulcers were mostly superficial. There was bleeding in the stomach which was associated with adhesion and dilatation. Ulcer index came 29.9 \pm 1.43. Cysteamine produced profuse ulcer in the upper part of duodenum. Ulcer index came 21.1 \pm 1.15.

Pretreatment of rats with leaves of *Amaranthus spinosus* L. (1g/kg, 2 g/kg) produced dose dependent reduction of ulcer index in ethanol as well as cysteamine treated rats when compared to control. Omeprazole produced significant protection (71.9% for gastric ulcer and 85.3% for duodenal ulcer) in ulcer formation. The anti ulcer activity of leaves of *Amaranthus spinosus* L. was, however, less than that of omeprazole.

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