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# Screening the efficacy of some East Himalayan medicinal plants against ethanol induced gastric ulcer in Albino Rats

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**Abstract**

Role of twenty medicinal plants of Sikkim and Darjeeling Himalayas [*Cassia alata, Bauhinia variegata, Aesculus indica, Berberis lyceum, Bergenia ciliata, Cedrus deodara, Gentiana kurroo, Hippophae rhamnoides, Juniperus communis, Pinus roxburghii, Potentilla fulgens, Thalictrum foliolosum, Aconitum heterophyllum, Gloriosa superba, Jasminum humile , Juniperus macropoda, Calotropis gigantea, Taraxacum officinalis, Oroxylum indicum* and *Hippophae salicifolia*were] studied in ethanol induced gastric ulcer in albino rats. Plants were chosen on the basis of their beneficial effects in stomach disorders as mentioned in Ayurvedic text. Results showed that *Juniperus macropoda, Calotropis gigantean, Oroxylum indicum, Hippophae salicifolia, Bauhinia variegata* and *Gloriosa superba* had anti-gastric ulcer activity while 14 other plants have no such activity in ethanol induced gastric ulcer in albino rats.

***Key words:*** Medicinal plants, Ethanol, Gastric ulcer.

## INTRODUCTION

Ethnic uses of various medicinal plants of Darjeeling and Sikkim Himalayas in stomach disorder has been described in Ayurvedic text (Chopra & Chopra 1958; Gurung 2002). Tempted on the observations we had undertaken a project to screen out such medicinal plants for their anti- gastric ulcer activities, if any, in experimental ulcer model. In this communication we report the results of screening of twenty medicinal plants of Darjeeling and Sikkim Himalayas for their anti gastric ulcer activity in ethanol induced gastric ulcer in albino rats

## METHODOLOGY

Eighteen species of angiospermic and two species of gymnospermic medicinal plants of Darjeeling and Sikkim Himalayas were screened for their anti-gastric ulcer activity, if any, in ethanol induced gastric ulcers in albino rats [Table 1]. Plants were collected from the herbal practitioners of Mirik, Kurseong, Kalimpong of Darjeeling district as well as Jorethang and Ranipool of Sikkim and were identified by Prof. A. P. Das of the department of Botany, University of North Bengal.

**Table 1:** Plants and plant-parts used for screening the anti-ulcer activities in induced ulcer albino rats.

| Medicinal plants | Family | Part used |
|---|---|---|
| *Aconitum heterophyllum* Wall. | Ranunculaceae | Root |
| *Aesculus indica* (Wall. ex Camb.) Hook. | Hippocastanaceae | Seed |
| *Bauhinia variegata* L. | Caesalpiniaceae | Bark |
| *Berberis lyceum* Hort. ex C. Koch | Berberidacaea | Stem |
| *Bergenia ciliate* (Haworth) Sternberg | Saxifragacaea | Root |

| | | |
|---|---|---|
| *Calotropis gigantean* (L.) Dryand. ex W.T. Aiton | Asclepiadaceae | Leaf |
| *Cassia alata* L. | Caesalpiniaceae | Leaf |
| *Cedrus deodara* Loud. | Pinaceae | Wood |
| *Gentiana kurroo* Royle | Gentianaceae | Root |
| *Gloriosa superb* L. | Liliaceae | Root |
| *Hippophae rhamnoides* L. | Elaeagnaceae | Fruit |
| *Hippophae salicifolia* D. Don | Eleagnaceae | Bark |
| *Jasminum humile* L. | Oleaceae | Leaf |
| *Juniperus communis* L. | Cupressaceae | Fruit |
| *Juniperus macropoda* Boisser | Cupressaceae | Fruit |
| *Oroxylum indicum* Ventenat | Bignoniaceae | Leaf |
| *Pinus roxburghii* Sarg. | Pinaceae | Leaf |
| *Potentilla fulgens* Wall. ex Hook. | Rosaceae | Root |
| *Taraxacum insigne* Wiinstedt & Jensen | Asteraceae | Leaf |
| *Thalictrum foliolosum* DC. | Ranunculaceae | Root |

The medicinal plants and their parts were chosen on the basis of their beneficial effect in stomach problems as claimed by herbal doctors and recorded in different Ayurvedic documents (Chopra & Chopra 1958; Gurung 2002).

**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 – 28º C and humidity 60 – 65% with 12 h light and dark cycle) before experimentation. Animals were fed on laboratory diet with water ad *libitum*. Ten rats were used for each set of experiment. The animal experiment was approved by the ethics committee of the Institute.

**Chemical:**
Ethanol (Baroda Chemical industries Ltd., Dabhoi) was used in the study.

**Preparation of the test drug:**
Parts used of the medicinal plants under study were sundried and powdered. The powder was used as the test drug.

**Production of gastric ulcers***:*
Ethanol induced gastric ulcer (Sairam *et al.* 2001): 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 ulcers.

**Anti gastric ulcer study:**
Rats were divided into 3 major groups;

1. Ethanol treated: Ethanol was given to rats.
2. Ethanol & test drug: Test drug (powdered part of the medicinal plant) was given to the rats orally 30 minutes prior to administration of ethanol. Test drug was used in the dose of 1.0 g/kg .
3. Ethanol and the test drug: Test drug (powdered part of the medicinal plant) was given to the rats orally 30 minutes prior to administration of ethanol.

Test drug was used in the dose of 2.0 g/kg. Test drug was given to rats orally through a feeding tube. Water was supplied *ad libitum*.

**Evaluation of ulcer index** *(*Szelenyi & Thiemer 1978):
Gastric / duodenal lesions were counted and the mean ulcerative index was calculated as follows:

I. Presence of edema, hyperemia and single sub-mucosal punctiform hemorrhage.
II. Presence of sub-mucosal hemorrhagic lesions with small erosions.
III. Presence of deep ulcer with erosions and invasive lesions.

**Ulcer Index** = (number of lesion I) x1 + (number of lesion II) x2 +(number of lesion III) x 3.

**Statistical analysis:**
Statistical analysis of the results was done by the method of Das & Bhattacharya (1974). p values less than 0.05 were considered significant.

## RESULTS

Results (Tables - 2 & 3) showed that ethanol produced massive gastric ulcers in all albino rats. Ulcer index varied from 28.1 ± 1.34 to 33.5 ± 1.88 . Pretreatment of rats with *Juniperus macropoda, Calotropis gigantean, Oroxylum indicum, Hippophae salicifolia, Bauhinia variegata* and *Gloriosa superba* produced dose dependant reduction in ulcer index. Results were statistically significant ($p < 0.001$) when compared to ethanol treated group. It was also observed that out of these six medicinal plants *Bauhinia variegata* had maximum anti-gastric ulcer effect. While *Bauhinia variegata* showed 50% reduction in ulcer index, *Juniperus macropoda, Calotropis gigantean, Oroxylum indicum, Hippophae salicifolia* and *Gloriosa superba* had 33.2%, 35.7%, 30.1%, 32.9% and 32.5% reduction in ulcer index, respectively.

**Table - 2:** Showing effects of medicinal plants against ethanol induced gastric ulcer in albino rats. For each drug three groups were made.

| Group | Ulcer index |
|---|---|
| Ethanol treated | 30.5 ± 1.51 |
| Ethanol + *Cassia alata* (1g/kg) | 29.7 ± 1.44 |
| Ethanol + *Cassia alata* (2g/kg) | 29.5 ± 1.41 |
| Ethanol treated | 31.3 ± 1.59 |
| Ethanol + *Aconitum heterophyllum* (1g/kg) | 30. 6 ± 1.52 |
| Ethanol + *Aconitum heterophyllum* (2g/kg) | 30.0 ± 1.46 |
| Ethanol treated | 29.6 ± 1.41 |
| Ethanol + *Aesculus indica* (1g/kg) | 29.5 ± 1.39 |
| Ethanol + *Aesculus indica* (2g/kg) | 29.0 ± 1.36 |
| Ethanol treated | 30.8 ± 1.64 |
| Ethanol + *Berberis lyceum* (1g/kg) | 30.5 ± 1.50 |
| Ethanol + *Berberis lyceum* (2g/kg) | 30.0 ± 1.46 |

| | |
|---|---|
| Ethanol treated | 32.5 ± 1.77 |
| Ethanol + *Bergenia ciliate* (1g/kg) | 31.5 ± 1.61 |
| Ethanol + *Bergenia ciliate* (2g/kg) | 30.9 ± 1.55 |
| Ethanol treated | 30.1 ± 1.44 |
| Ethanol + *Cedrus deodara* (1g/kg) | 29.5 ± 1.34 |
| Ethanol + *Cedrus deodara* (2g/kg) | 29.1 ± 1.30 |
| Ethanol treated | 33.5 ± 1.88 |
| Ethanol + *Gentiana kurroo* (1g/kg) | 32.9 ± 1.65 |
| Ethanol + *Gentiana kurroo* (2g/kg) | 32.5 ± 1.61 |
| Ethanol treated | 28.5 ± 1.55 |
| Ethanol + *Hippophae rhamnoides* (1g/kg) | 28.3 ± 1.45 |
| Ethanol + *Hippophae rhamnoides* (2g/kg) | 28.0 ± 1.40 |
| Ethanol treated | 31.6 ± 1.68 |
| Ethanol + *Jasminum humile* (1g/kg) | 31.5 ± 1.67 |
| Ethanol + Jasminum humile (2g/kg) | 31.0 ± 1.61 |
| Ethanol treated | 32.5 ± 1.76 |
| Ethanol + *Juniperus communis* (1g/kg) | 32.0 ± 1.61 |
| Ethanol + *Juniperus communis* (2g/kg) | 31.9 ± 1.59 |

[Values were mean ± SEM of 10 animals in each group. Data were non significant.]

**Table 3:** Showing effects medicinal plants against ethanol induced gastric ulcer in albino rats.

| **Group** | **Ulcer index** |
|---|---|
| Ethanol treated | 28.1 ± 1.34 |
| Ethanol + *Pinus roxburghif* (1g/kg) | 28.0 ± 1.33 |
| Ethanol + *Pinus roxburghif* (2g/kg) | 27.5 ± 1.21 |
| Ethanol treated | 30.7 ± 1.59 |
| Ethanol + *Potentilla fulgens* (1g/kg) | 30.5 ± 1.52 |
| Ethanol + *Potentilla fulgens* (2g/kg) | 30.0 ± 1.44 |
| Ethanol treated | 31.5 ± 1.65 |
| Ethanol + *Thalictrum foliolosum* (1g/kg) | 30.9 ± 1.59 |
| Ethanol + *Thalictrum foliolosum* (2g/kg) | 30.5 ± 1.55 |
| Ethanol treated | 30.0 ± 1.43 |
| Ethanol + *Bauhinia variegate* (1g/kg) | 15.0 ± 1.30* |
| Ethanol + *Bauhinia variegate* (2g/kg) | 9.5 ± 0.65* |
| Ethanol treated | 31.9 ± 1.67 |
| Ethanol + *Calotropis gigantea* (1g/kg) | 20.5 ± 1.44* |
| Ethanol + *Calotropis gigantea* (2g/kg) | 15.0 ± 1.21* |

| | |
|---|---|
| Ethanol treated | 30.4 ± 1.63 |
| Ethanol + *Gloriosa superb* (1g/kg) | 20.5 ± 1.34* |
| Ethanol + *Gloriosa superb* (2g/kg) | 16.0 ± 1.33* |
| | |
| Ethanol treated | 29.1 ± 1.45 |
| Ethanol + *Hippophae salicifolia* (1g/kg) | 19.5 ± 1.45 * |
| Ethanol + *Hippophae salicifolia* (2g/kg) | 17.3 ± 1.31 * |
| | |
| Ethanol treated | 30.7 ± 1.62 |
| Ethanol + *Juniperus macropoda* (1g/kg) | 20.5 ± 1.44* |
| Ethanol + *Juniperus macropoda* (2g/kg) | 15.2 ± 1.51 * |
| | |
| Ethanol treated | 30.8 ± 1.75 |
| Ethanol + *Oroxylum indicum* (1g/kg) | 21.5 ± 1.49 * |
| Ethanol + *Oroxylum indicum* (2g/kg) | 16.8 ± 1.23* |
| | |
| Ethanol treated | 30.0 ± 1.50 |
| Ethanol + *Taraxacum officinale* (1g/kg) | 29.5 ± 1.41 |
| Ethanol + *Taraxacum officinale* (2g/kg) | 29.3 ± 1.39 |

[Values were mean ± SEM of 10 animals in each group. * $p < 0.001$ when compared to ethanol treated group.]

Results further showed that *Cassia alata, Aesculus indica, Berberis lyceum, Bergenia ciliata, Cedrus deodara, Juniperus macropodda* or *Calotropis gigantea* or *Oroxylum indica* or *Hippophae salicifolia* or *Bauhinia variegata* or *Gloriosa superba , Gentiana kurroo, Hippophae rhamnoides, Juniperus communis, Pinus roxburghii, Potentilla fulgens, Thalictrum foliolosum, Aconitum heterophyllum, Jasminum humile* and *Taraxacum officinalis* had no anti-gastric ulcer activity either in 1g/kg or in 2g/kg doses in ethanol induced gastric ulcer in albino rats.

## DISCUSSION

Anti gastric ulcer activities of vegetables and herbs were known in literature (Sanyal *et al.* 1961; Mitra 1980, 1981; Akah *et al.* 1999; Shetty *et al.* 2000; Sairam *et al.* 2001; Maity *et al.* 2003; Dharmani & Palit 2006). Earlier, we also reported the anti gastric ulcer activities of some medicinal plants in different experimental ulcer models (Mitra, 1982, 1985, 2001; Mitra & Mitra 2005).

In the present study while screening twenty medicinal plants of Darjeeling and Sikkim Himalayas for their anti gastric ulcer activity, we noticed that *Juniperus macropod, Calotropis gigantean, Oroxylum indicum, Hippophae salicifolia, Bauhinia variegata* and *Gloriosa superba* had dose dependant anti gastric ulcer activity against ethanol induced

gastric ulcers in albino rats. Results were significant up to the level of $p < 0.001$. *Bauhinia variegata* had maximum while *Oroxylum indicum* had minimum anti gastric ulcer activity. Anti gastric ulcer activities of these plants are now being tested in other gastric ulcer models induced by various drugs like aspirin, salicyclic acid, indomethacin, glucocorticoids etc. and stresses like pyloric ligation, continuous swimming, immobilization of limbs etc. in albino rats.

Rest fourteen medicinal plants used in this study had, however, no anti gastric ulcer activity under the experimental conditions. It might so happen that these medicinal plants have anti gastric ulcer activity in further higher doses or they may have anti gastric ulcer activity in other experimental ulcer models. Work is now going on in this direction.

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