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SEASONAL VARIATION IN ANTI-ULCEROGENIC EFFECT OF *ASTILBE RIVULARIS* (SAXIFRAGACEAE) LEAVES

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ABSTRACT

Seasonal variation in anti ulcerogenic effect of *Astilbe rivularis* leaves, if any, was studied in peptic ulcer models in rats. Results showed that *Astilbe rivularis* leaves collected during the months of May and June had maximum anti peptic ulcer activity in ethanol induced gastric ulcers and cysteamine induced duodenal ulcers in rats.

INTRODUCTION

As early as 1955, Fluck and Pharm [1] showed influence of climate on the active principles in medicinal plants. Thereafter, series of experiments were conducted in this direction. Now a days numerous reports are available in literature which suggest that accumulation of chemical compounds in roots, stem and leaves of plants varies with seasons.

It was therefore thought worthwhile to study the seasonal variation, if any, in the anti ulcerogenic effect of *Astilbe rivularis* (Family: Saxifragaceae) leave in experimental peptic ulcer models as we had confirmed [2] anti peptic ulcer activity of *Astilbe rivularis* leaves in ethanol induced gastric ulcers and cysteamine induced duodenal ulcers in rats

MATERIALS AND METHODS

Plant Material

Astilbe rivularis leaves were collected in morning hours (9 - 10 AM) from the medicinal plants garden of the University of North Bengal, Dist. Darjeeling, West Bengal, India, during the periods of January – February, March – April, May – June, July – August, September – October and November – December 2012. Leaves were authenticated by the experts of the department of Botany of the said University. A voucher specimen was kept in the department of Biochemistry, North Bengal Medical College, Dist. Darjeeling, West Bengal, India for future reference.

Figure 1. *Astilbe rivularis* Buch. – Ham. Ex D. Don

Preparation of the Test Drug

Leaves of *Astilbe rivularis* were shade dried and powdered. This powder was used as test drug.

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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*. 8 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) and cysteamine (Sigma Chemical Co., USA) were used in the study.

Acute toxicity study

In our earlier communication [2] we have reported that leaves of *Astilbe rivularis* is not toxic for rats.

Production of peptic ulcer

(a) 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.

(b) 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.

Antiulcer Study

Rats were divided into following groups.

(1) Drug treated control:- In this group either ethanol or cysteamine was given to rats

(2) Drug and *Astilbe rivularis* (January – February):

Powder from leaves of *Astilbe rivularis* of the periods January – February was given to the rats orally through feeding tube 30 minutes prior to administration of ethanol and 30 minutes before each dose of cysteamine hydrochloride. Astilbe rivularis was used in the dose of 1g/kg body weight of rats as per our earlier work [2].

(3) Drug and *Astilbe rivularis* (March – April):

Powder from leaves of *Astilbe rivularis* of the periods of March – April was given to the rats. Rest part was same to that of group – 2.

(4) Drug and *Astilbe rivularis* (May – June):

Powder from leaves of *Astilbe rivularis* of the periods May – June was given to the rats. Rest part was same to that of group – 2.

(5) Drug and *Astilbe rivularis* (July – August):

Powder from leaves of *Astilbe rivularis* of the periods July – August was given to the rats. Rest part was same to that of group – 2.

(6) Drug and *Astilbe rivularis* (September – October):

Powder from leaves of *Astilbe rivularis* of the periods September–October was given to the rats. Rest part was same to that of group – 2.

(7) Drug and *Astilbe rivularis* (November – December):

Powder from leaves of *Astilbe rivularis* of the periods November – December was given to the rats. Rest part was same to that of group – 2.

Evaluation of ulcer index

Evaluation of ulcer index was done by the method of Szelenyi and Thiemer [5]. 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

The values were expressed as mean ± SEM and were 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 test and significance was set at $p < 0.05$.

RESULTS

Seasonal variation in anti-gastric ulcer effect of the leaves of *Astilbe rivularis* is given 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 30.2 ± 3.12.

Maximum anti gastric ulcer activity of the leaves of *Astilbe rivularis* was noted during the period May – June. Ulcer index came 14.5 ± 1.31. Ulcer inhibition was 51.98%.

Table – 2 showed seasonal variation in anti-peptic ulcer activity of the leaves of *Astilbe rivularis* in cysteamine induced duodenal ulcers in rats. Cysteamine produced profuse ulcer in the upper part of duodenum of rats. Ulcer index was 23.2 ± 2.92. Maximum anti peptic ulcer activity of the leaves of *Astilbe rivularis* was noted during the period May – June. Ulcer index came 12.1 ± 1.22. Ulcer inhibition was 47.84%.

Figure 2. Seasonal variation in anti-duodenal ulcer activity of the leaves of *Astilbe rivularis* in cysteamine induced duodenal ulcer in rats

Figure 3. Seasonal variation in anti-gastric ulcer activity of the leaves of *Astilbe rivularis* in ethanol induced gastric ulcer in rats

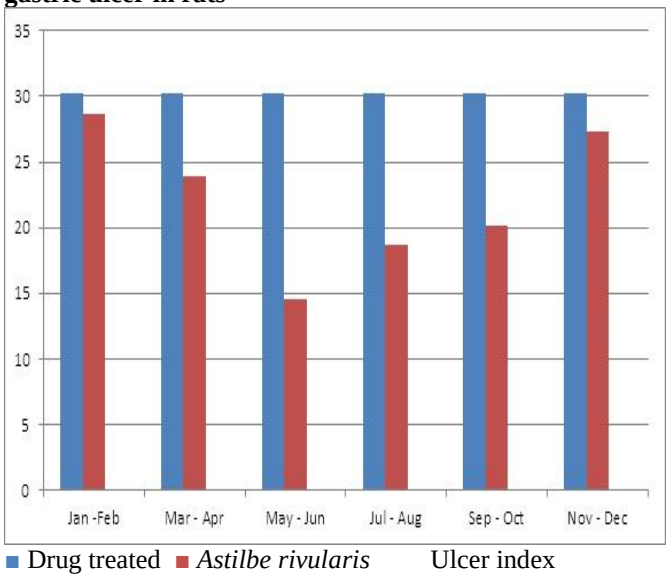

Table 1. Showing seasonal variation in anti-gastric ulcer activity of the leaves of *Astilbe rivularis* in ethanol induced gastric ulcer in rats

Group & Dose	Ethanol (1 mL/200 g) Ulcer Index (Mean ± SEM)	Ulcer Inhibition (%)
Drug treated control	30.2±3.12	--
Astilbe rivularis (January - February)	28.7±3.01	4.96
Astilbe rivularis (March - April)	23.9±2.51	20.86
Astilbe rivularis (May - June)	14.5±1.31**	51.98
Astilbe rivularis (July - August)	18.7±1.18*	38.07
Astilbe rivularis (September - October)	20.1±1.03*	33.44
Astilbe rivularis (November - December)	27.3±2.94	9.60

Astilbe rivularis (1 g/kg). Values were Mean ± SEM of eight animals in each group. * p <0.05, **p < 0.001 when compared to drug control.

Table 2. Showing seasonal variation in anti-peptic ulcer activity of the leaves of *Astilbe rivularis* in cysteamine induced duodenal ulcers in rats

Group & Dose	Cysteamine (400 mg /kg) Ulcer index (mean ± SEM)	Ulcer inhibition (%)
Drug treated control	23.2±2.22	--
Astilbe rivularis (January - February)	22.5±2.17	3.01
Astilbe rivularis(March - April)	20.1±1.99	13.36
Astilbe rivularis (May - June)	12.1±1.22**	47.84
Astilbe rivularis(July - August)	14.2±1.30*	38.79
Astilbe rivularis(September - October)	15.3±1.17*	34.05
Astilbe rivularis(November - December)	21.9±2.43	5.60

Astilbe rivularis (1 g/kg). Values were Mean ± SEM of eight animals in each group. * p <0.05, **p < 0.001 when compared to drug control.

DISCUSSION

Astilbe rivularis, one of the medicinal plants of Eastern Himalaya specially of Sikkim Himalaya, is known as Buriokahti in Nepali and as Pango in Lepcha [6]. The plant is distributed in Common Temperate Himalaya at a range of 5000 – 9000 feet. It is also found on sloppy waste place. The plant has tall herb stem, leaves are covered with hairs [7,8]. Ethnic use of *Astilbe rivularis*, as reported in literature is in peptic ulcer. Root juice of the plant, two tea spoonful thrice a day, is given to patients suffering from peptic ulcer [9].

Tempted on the ethnic use we undertook studies and noted that leaves of *Astilbe rivularis* could exert anti peptic ulcer activity against ethanol induced gastric ulcer as well as cysteamine induced duodenal ulcer models in albino rats [2].Since medicinal values of plants vary with season [10-14], we were interested to note the seasonal variation, if any, in the anti-peptic ulcer activity of leaves of *Astilbe rivularis*.

Our results showed that leaves of *Astilbe rivularis* during the periods May – June, July – August and September – October had anti peptic ulcer activity against ethanol induced gastric ulceration and cysteamine induced duodenal ulceration in rats, but maximum effect was seen during May – June.

We are now interested to see the effect of season on concentration of active ingredients in leaves of *Astilbe rivularis* responsible for anti-peptic ulcer activity. Work is now in progress in this direction.

CONCLUSION

Seasonal variation in anti-peptic ulcer activity of the leaves of *Astilbe rivularis* was studied in experimental peptic ulcer models. Results showed that leaves of *Astilbe rivularis* during the period May – June had maximum anti peptic ulcer activity against ethanol induced gastric ulceration and cysteamine induced duodenal ulcerations in rats.

REFERENCES

1. Fluck H. (1955). The influence of climate on the active principles in medicinal plants. *J Pharm Pharmacol*, **7**, 361-383.
2. Mitra P and Mitra PK. (2008). Use of *Astilbe rivularis* Buch. – Ham. Ex D. Don as anti-peptic ulcer agent, *Pleione*, 2(1), 74 – 76.
3. Sairam K, Rao Ch V, Goel RK. (2001). Effect of Convolvulus pluricaulis Chois on gastric ulceration and secretion in rats. *Indian J Exp. Biol*. 39, 137 – 142.
4. Parmar NS & Desai JK. (1993). A review of the current methodology for the evaluation of gastric and duodenal anti-ulcer agents. *Indian J Pharmacol*, 2, 120 – 135.
5. Szelenyi I and Thiemer K. (1978). Distension ulcer as a model for testing of drugs for ulcerogenic side effects. *Arch. Toxicol*, 41, 99 – 105.
6. Gurung Bejoy. (2002). *The medicinal plants of Sikkim Himalaya*. Pub. Bejoy Gurung, East Sikkim, 55.
7. Das AP and Ghosh Chandra. (2009). *Germplasm collection in garden of medicinal plants. University of North Bengal*, Siliguri, West Bengal, 8.
8. Chopra Col Sir RN & Chopra IC. (1958). *Indigenous drugs of India*, U.N.Dhar and Sons Private Limted, Kolkata, 605.
9. Kirtikar KR, Basu BD. (2001). *Indian Medicinal Plants*, vol. 9, 2nd ed.Oriental Enterprises, Rajpur, Dehradun, Uttaranchal, India, 2832-2836.
10. Arambewela LSR and Ratnayake CK. (1988). Vasicine contents and their seasonal variation in *Adhatoda vasica*. *Fitoterapia*, 59(2), 151-153.
11. Feeny P. (1970). Seasonal changes in oak leaf tannins and nutrients as a cause of spring feeding by winter moth caterpillars. *Ecology*, 51, 565–581.
12. Gupta PL. (1977). Variation in morphological characters and active principle constituents of *Eclipta prostrata* Linn. under different seasonal and soil conditions. *JRIM*, 12(1), 80- 84.
13. Mauffette Y and Oechel WC. (1989). Seasonal variation in leaf chemistry of the coast live oak *Quercus agrifolia* and implications for the California oak moth. *Phryganidia californica Oecologia*, 79, 439–445.
14. Schultz JC, Nothnagle PJ and Baldwin IT. (1982). Seasonal and individual variation in leaf quality of two northern hardwoods tree species. *American Journal of Botany*, 69, 753–759.