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Anti-inflammatory Activity of *Barleria prionitis* Linn.

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Abstract

The literature survey reveals that the genus *Barleria* offers a considerable scope for the study of bioactive constituents. The methanol extract of *Barleria prionitis* Linn. showed significant anti-inflammatory activity comparable to control and standard indomethacin.

Key words: *Barleria prionitis* Linn., Carrageenan-induced oedema, 500 mg/kg, p.o.

1. Introduction

The genus *Barleria* from the family Acanthaceae consists of 230 species, which are herbs or undershrubs; they are distributed in Africa and tropical Asia. Twenty-six species have been recorded in India; they are chiefly found in the mountains of southern and western parts of India and a few are found in tropical and subtropical Himalayas. Stems are terete or obscurely four-angled and glabrous. Leaves are petioled, elliptic, acuminate and tipped with a spinule. Flowers are in cymes combined into a terminal. Bracts are linear and spinescent. Outer two calyx segments are oblong-lanceolate and spine-tipped, while inner two are linear-lanceolate and mucronate. Corolla is orange-yellow or cream in colour and is two-lipped. Capsule is long and ovoid and is two-seeded [1, 2]. *Barleria prionitis* Linn. is an annual hurb, is 1–3 feet high and is locally known as 'Vajradanti' in India and 'Katukaradu' in Sri Lanka [3].

Not much work has been done on the anti-inflammatory activity of genus *Barleria*. In our present investigation, we have screened the methanol extract of the whole plant of *Barleria prionitis* Linn. for its anti-inflammatory activity.

2. Materials and Methods

2.1 Plant Material

The whole plant of *Barleria prionitis* Linn (family Acanthaceae), used for the present investigation, was supplied by Hari Om Herbs, Santinagar Chhutmalpur, Uttar Pradesh. The specimen of the plant material has been kept at the herbarium of Lala Lajpat Rai College of Pharmacy, Moga. The plant was identified and authenticated by Dr K. Madhava Chetty, Assistant Professor, Dept of Botany, Sri Venkateswara University, Tirupati.

2.2 Preparation of Methanol Extract

The whole plant of *Barleria prionitis* Linn. was dried under shade and reduced to a moderately coarse powder using hammer mill. The powdered material (2.9 kg) was extracted with methanol by cold percolation till complete exhaustion. The solvent from the extract was distilled off and the removal of last traces under vacuum yielded a residue (125 g, yield 4.3%).

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Table 1: Effect of *Barleria prionitis* methanol extract on carrageenan paw oedema in rats

Treatment with (mg/kg)	Mean swelling in paw volume±SEM						
	30 min	60 min	90 min	120 min	150 min	180 min	210 min
Negative control	33.53 ±2.23	37.34 ±3.27	46.16 ±3.01	39.50 ±3.82	33.23 ±3.35	40.18 ±3.16	34.89 ±3.31
Indomethacin (20 mg/kg, p.o.)	4.88 ±0.73*	5.55 ±0.83*	5.29 ±0.84*	6.62 ±0.89*	4.71 ±1.06*	3.06 ±0.98*	2.49 ±0.93*
Methanol extract (500 mg/kg, p.o.)	17.55 ±2.20*	19.74 ±2.47*	22.44 ±2.83*	19.38 ±2.72*	23.70 ±2.74	27.56 ±3.41*	34.27 ±4.39

Values are mean±SEM; *$p<0.05$ is significantly different from mean value control (*t*-test)

2.3 Experimental Animals

Male wistar albino rats (150–200 g) were procured from Central Animal House, Panjab University, Chandigarh. The animals were maintained at standard diet (Lipton India Ltd., Bangalore) and tap water ad libitum.

2.4 Carrageenan-induced paw oedema

The methanol extract of the whole plant of *Barleria prionitis* was subjected to screening for anti-inflammatory activity using carrageenan-induced rat paw oedema model. The animals were pretreated with methanol extract (500 mg/kg, p.o.) suspended in 1% tween 80. Positive control animals received indomethacin (20 mg/kg, p.o.) suspended in 1% tween 80. Negative control animals received a similar volume of 1% tween 80. After 30 min, 0.1 ml of 1% w/v suspension of carrageenan in distilled water was injected subcutaneously on to the sub-plantar region of the left hind paw of the animals. The paw volume was measured plethysmographically by mercury displacement method at every half-hourly interval until the period of 210 min after the injection of carrageenan. The percentage inhibition was calculated using the following equation:

$$\text{Percentage inhibition} = 100\left[1-\frac{V_t}{V_c}\right],$$

where V_c = oedema volume of control animal

V_t = oedema volume of treated animal

3. Results

The anti-inflammatory effects of methanol extract on carrageenan-induced rat paw oedema are summarised in Table 1. Optimum oedema volume in control group was achieved in 90 min. Thus the optimum percentage inhibition of methanol extract and 20 mg/kg indomethacin were calculated in 90 min as compared to the optimum oedema effect in control group as shown in Table 2. The methanol extract showed 51.39% inhibition with the administered dose (500 mg/kg, p.o.)

Table 2: Percentage inhibition of carrageenan-induced paw oedema in 90 min in rats

Group	% of oedema (mean±SEM)	% inhibition of oedema (obtained from average value)
Negative control	46.16±3.01	0
Indomethacin (20 mg/kg, p.o.)	5.29±0.84	88.54*
Methanol extract (500 mg/kg, p.o.)	22.44±2.83	51.39*

*$p<0.001$ indicates significant difference compared with control using ANOVA followed by Tukey Comparison Test

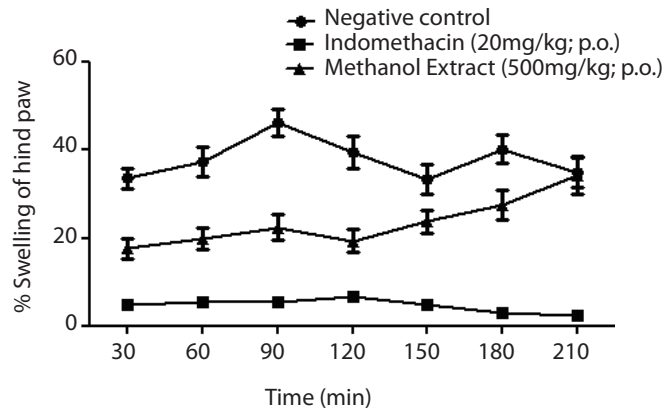

Fig. 1. Carrageenan-induced paw oedema in rats and attenuating effects of negative control, methanol extract and indomethacin administered per orally

as compared to 88.54% of oedema inhibition by 20 mg/kg indomethacin.

4. Discussion

Carrageenan-induced paw oedema has been commonly used as an experimental animal model for acute inflammation and is believed to be biphasic. The early phase (i.e. 1–2 hr) of the carrageenan model is mainly mediated by histamine, serotonin and increased synthesis of PGs in the damaged tissue surroundings.

The late phase is sustained and mediated by the release of PGs, the products of cycloxygenase and lipoxygenase enzymes [4]. Formations of arachidonic acid via cycloxygenase and lipoxygenase pathway represent two important classes of inflammatory mediator. The product of cycloxygenase pathway, mainly prostaglandin E2, is known to cause cardinal signs of inflammation, and the product of lipoxygenase pathway, mainly leukotrine B4, is the mediator of leukocyte activation in the inflammation. From the result, it is clear that caragennan-induced paw oedema for the administered dose (500 mg/kg, p.o.) is comparable with reference standard indomethacine, which is a cycloxygenase inhibitor. But anti-inflammatory activity against caragennan-induced paw oedema is also shown by lipoxygenase inhibitor. Hence inhibition of caragennan-induced paw oedema by crude extract may be due to inhibitory activity of lipoxygenase enzymes [5].

Therefore, from the present study, we can conclude that methanolic extract of *Barleria prionitis* Linn. for the dose of 500 mg/kg, p.o. shows anti-inflammatory activity in the early stage as well as in the late stage (up to 180 min), and after that, the effect becomes similar to that of negative control (Fig. 1).

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