

Evaluation of Antiinflammatory Activity of Ethanol Extracts of *Pleiospermium alatum* (Wall Ex Wight & Arn) Swingle

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Abstract: The anti-inflammatory effects of *Pleiospermium alatum* was studied in carrageenan induced oedema in albino rats. The ethanol extracts of leaf and bark of *Pleiospermium alatum* at the dose level of 100 and 200 mg/kg body weight were evaluated for anti-inflammatory activity. The results were compared with Indomethacin (10mg/kg).

Key words: *Pleiospermium alatum* (Wall Ex Wight & Arn) Swingle, Antiinflammatory Activity, Ethanol Extracts of *Pleiospermium alatum*.

Introduction

Inflammation is considered as a primary physiologic defense mechanism that helps body to protect itself against infection, burn, toxic chemicals, allergens or other noxious stimuli, an uncontrolled and persistent inflammation may act as an etiologic factor for many of these chronic illnesses¹. Although it is a defense mechanism, the complex events and mediators involved in the inflammatory reaction can easily be induced². The side effects of the currently available anti-inflammatory drugs pose a major problem during their clinical uses³. The search for a cure for inflammatory disease continues along with traditional and alternative medicine. Many herbal supplements have been used for the treatment of inflammation but

not all of them have scientific evidence to support their effectiveness.

Pleiospermium alatum (Wall ex Wight & Arn) Swingle belongs to the family Rutaceae. It is widely grown in India. To our knowledge no report on the effect of this plant in experimental inflammation. This study was therefore undertaken to evaluate the effect of ethanol extract of the leaf and bark of *Pleiospermium alatum* on anti-inflammatory activity in carrageenan induced rat paw oedema.

Materials and Methods

Plant material

The leaf and bark of *Pleiospermium alatum* (Wall ex Wight & Arn) Swingle collected from Anaikatti, Coimbatore, Tamil Nadu. The plant was identified

with the help of local flora and authenticated in Botanical Survey of India, Southern Circle, Coimbatore, Tamil Nadu, India. A voucher specimen was deposited in Ethnopharmacology unit, Research Department of Botany, V.O.Chidambaram College, Tuticorin, Tamil Nadu.

Preparation of plant extract for anti-inflammatory activity

The leaf and bark of *Pleiospermium alatum* (Wall ex Wight & Arn) Swingle were cut into small pieces, washed, shade dried at room temperature and the dried parts were powdered in a Wiley mill. Hundred grams of leaf and bark powder were packed in a Soxhlet apparatus and extracted separately with ethanol. The ethanol extracts were concentrated in a rotary evaporator. The concentrated ethanol extracts were used for anti-inflammatory activity.

Animals

Adult Wistar albino rats of either sex (150-200g) were used for present investigation. Animals were housed under standard environmental conditions at temperature (25±2°C) and light and dark (12:12 h). Rats were fed standard pellet diet (Goldmohur brand, MS Hindustan lever Ltd., Mumbai, India) and water *ad libitum*.

Acute toxicity study

For toxicity studies, six Albino rats of either sex were administered orally with the test substance in the range of doses 200-2000 mg/kg and the mortality rates were observed after 72h. The ethanol extract of leaf and bark of *Pleiospermium alatum* (Wall ex Wight & Arn) Swingle has shown no mortality at 2000 mg/Kg. Therefore 2000mg/Kg dose was considered as LD₅₀ cut off dose (safe dose). So 1/20 and 1/10 of that were selected (100 and 200 mg/Kg) for the experiment as sub maximal and maximal dose.

Antiinflammatory activity

Carrageenan-induced hind paw oedema

Albino rats of either sex weighing 150-200 grams were divided into four groups of six animals each. The dosage of the drugs administered to the different groups was as follows. Group I - Control (normal saline 0.5 ml/Kg), Group II – leaf extract of

Pleiospermium alatum (100 mg/kg and 200 mg/kg, p.o.), Group III – bark extract of *Pleiospermium alatum* (100 mg/kg and 200 mg/kg, p.o.) and Group IV - Indomethacin (10 mg/kg, p.o.). All the drugs were administered orally.

After one hour of the administration of the drugs, 0.1 ml of 1% W/V carrageenan solution in normal saline was injected into the subplantar tissue of the left hind paw of the rat and the right hind paw was served as the control. The paw volume of the rats were measured in the digital plethysmograph (Ugo basile, Italy), at the end of 0 min., 60 min., 120 min., 180min., 240min., 360min., and 480min. The percentage increase in paw oedema of the treated groups was compared with that of the control and the inhibitory effect of the drugs were studied. The relative potency of the drugs under investigations was calculated based upon the percentage inhibition of the inflammation.

Percentage inhibition

$$\frac{\text{Control (\% increase in paw volume in 3}^{\text{rd}} \text{ hour)} - \text{Test (\% increase in paw volume in 3}^{\text{rd}} \text{ hour)}}{\text{Control (\% increase in paw volume in 3}^{\text{rd}} \text{ hour)}} \times 100$$

Statistical analysis

The data were analyzed using student's t-test statistical methods. For the statistical tests a p values of less than 0.01 and 0.05 was taken as significant.

Results

The present study of anti-inflammatory activity of ethanol extracts of leaf and bark of *Pleiospermium alatum* against carrageenan induced paw oedema are shown in Table 1. The anti-inflammatory activity of ethanol extracts of the leaf and bark of *Pleiospermium alatum* significantly inhibited the rat paw oedema at 3rd hr post carrageenan were 39.64% and 52.88% for 100 and 200mg/kg of leaf extract and 33.48% and 35.29% for 100 and 200mg/kg of bark extract respectively. The results were compared with indomethacin 10mg/kg show percentage paw reduction of 56.86%.

Table. 1. Anti-Inflammatory Activity of Ethanol Extract of *Pleiospermium alatum* Leaf and Bark against Carrageenan-induced Paw Oedema in Albino Rats

Treatment	Dose mg/kg	Oedema volume (ml)				% Inhibition after 180 min
		0 min	60 min	120 min	180 min	
CONTROL (Group-I)	Normal saline	36.05±1.58	71.13±2.31	92.54±3.91	119.56±7.33	—
<i>P.alatam</i> leaf extract (Group-II)	100 mg/kg(LD)	30.21±0.93	59.34±2.11*	83.14±4.03	72.16±5.11*	39.64
	200 mg/kg(HD)	21.03±1.03*	33.59±1.98**	61.53±3.91*	56.33±3.69**	52.88
<i>P.alatam</i> bark extract (Group-III)	100 mg/kg(LD)	31.53±0.96	62.34±2.24	85.56±3.46	79.53±2.96*	33.48
	200 mg/kg(HD)	26.31±1.32*	37.14±1.63**	66.23±2.91*	77.36±1.43*	35.29
Indomethacin (Group-IV)	10 mg/kg	26.56±1.04*	30.96±1.16**	48.53±2.09**	51.57±1.94**	56.86

* $p < 0.05$, ** $p < 0.01$ when compared to control

Discussion:

Carrageenan-induced hind paw oedema is the standard experimental model of acute inflammation. Carrageenan is the phlogistic agent of choice for testing antiinflammatory drugs as it is not known to be antigenic and is devoid of apparent systematic effects⁴. Carrageenan induced oedema is a biphasic response. The first phase is mediated through the release of histamine, serotonin and kinins whereas the second phase is related to the release of prostaglandin and slow reaching substances which peak at 3rd hr⁵. The ethanol extracts of *Pleiospermium alatum* produced dose-dependent and significant inhibition of carrageenan induced paw oedema. Of the studied plant parts, leaf of *Pleiospermium alatum* showed more antiinflammatory activity at the dose of 200mg/kg when compared with standard drug indomethacin.

In accordance with preliminary phytochemical screening, it may be hypothesized flavonoid which are present in the extracts, could be considered responsible for the antiinflammatory activity. Flavonoids are known to target prostaglandins which are involved in the last phase of acute inflammation⁶. Hence, the presence of flavonoids may be contributory to the antiinflammatory activity of ethanol extracts of *Pleiospermium alatum*. Further studies may reveal the exact mechanisms of action responsible for the antiinflammatory activity of *Pleiospermium alatum*.

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