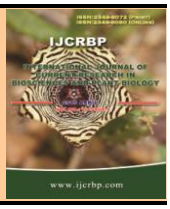
EXCELLENT PUBLISHERS

International Journal of Current Research in Biosciences and Plant Biology

ISSN: 2349-8080 Volume 2 Number 4 (April-2015) pp. 157-160

www.ijcrbp.com



Original Research Article

Anti-Inflammatory Activity of *Jasminum sambac* (L.) Ait. (var. Bell of India) Leaves

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A b s t r a c t

The ethanol (50%) extract of the leaves of *Jasminum sambac* (var. Bell of India) was investigated for its anti-inflammatory activities in animal models. Anti-inflammatory activity was studied in Albino rats using carrageenan induced hind paw oedema and cotton pellet induced granuloma model. The extract at 100, 200 and 400mg/kg body weight reduced significantly the formation of oedema by carrageenan and granuloma weight in the cotton pellet as compared to control rats. The extract caused dose dependent decrease paw oedema and weight of granuloma. The ethanolic (50%) extract at and 400mg/kg b.wt. exhibited potential anti-inflammatory activity when compared with other doses of plant extract in carrageenan induced method and cotton pellet method. The effect was also comparable to dichlofenac, the standard drug in this study.

K e y w o r d s

Anti-inflammatory activity

Granuloma

Jasminum sambac

Leaf extract

Paw oedema

Introduction

Jasminum sambac (L.). Ait. is a twiner belongs to the family Oleaceae. "Bell of India" is one of the varieties of *J. sambac*. It is an ever green twiner, with simple leaves, opposite or alternate. This plant is known commonly as "*Iruvatchi*" in Tamil. The leaves are used in ulcerations or eruptions in the mouth. Fresh juice of leaves is used as an application for corns; an oil preparation containing the juice is used in otorrhoea. The whole plant is considered to be anthelmintic, diuretic and emmenagogue. Flowers are used in skin diseases, headache and eye disorders (Chopra et al., 1956). Inflammation is the complex biological response of vascular tissue to harmful stimuli, such as pathogens, damaged cells, or irritants (Ferrero-Miliani et al., 2007). Herbal drugs are affordable and ecofriendly alternative to modern medicine. A number of plants are yet to be subjected for various scientific validations. One of such plant species is *J. sambac* var. Bell of India. Thus, in the present study, preliminary phytochemical screening and anti-inflammatory activity of *J. sambac* var. Bell of India was studied.

Materials and methods

Plant material

The leaves of *J. sambac* (L.)Ait. (Bell of India) were collected during vegetative phase (January-February) from the areas of Thanjavur District in Tamil Nadu. The plant was identified and authenticated in the Department of Herbal Science, Tamil University, Thanjavur and the voucher specimen was deposited at Tamil University herbarium (TUH-210).

Preparation of extract

The plant parts (leaves) were collected and dried under shade. These dried materials were mechanically coarsely powdered and stored in an air tight container. They were soaked in alcohol (50%) and kept for 48 h. The extract thus obtained was decanted and filtered. The clear extract was subsequently concentrated using rotary vacuum evaporator. The concentrated extracts were collected in a Petridish and air dried at room temperature.

Phytochemical screening

Qualitative test for the presence of plant secondary metabolites such as alkaloids, carbohydrates, terpenoids, flavonoids, saponins, glycosides, tannins and phenol were carried out using standard procedures (Trease and Evans, 1983).

Animals

Albino rats of either sex weighting 180-200g were used. The animals were fed with standard animal feed (Hindustan Lever Ltd.) and water *ad libitum*. All the animals were acclimatized to the laboratory conditions prior to experimentation.

Acute toxicity studies

Acute toxicity study was performed for the extracts to ascertain safe dose by acute oral toxic class method as per 423 guidelines (OECD) (Ecobichon, 1997).

Acute anti-inflammatory studies

Carrageenan induced rat-paw oedema method

Carrageenan induced rat paw oedema method (Winter et al., 1962) was followed for acute anti-inflammatory study. Albino rats weighing about 180 -200g were separated into 5 groups of 6 in each. The rat paw oedema was provoked by sub-plantar injection of 0.1ml aqueous suspension of 1% carrageenan sodium [in 0.9% NaCl (w/v)] in the left hind-paw. The hind-paw volume was measured by dipping the foot in the mercury bath of the Plethysmograph-apparatus up to the anatomical hairline on lateral malleolus (Goldenberg and Ilse, 1977). The initial paw volume was measure and recorded. First group of animals were served as negative control and given 0.75% CMC (5ml/kg). The second group of animals were served as positive control, which were given Dichlofenac sodium (5mg/kg). The extracts and salts were administered orally one hour before commencing the experiments at a dose of 100, 200 and 400mg/kg body weight. Carrageenan (1%) suspension in normal saline was prepared 1h before use. 0.1ml was injected under the plantar aponeurosis. After 3 h of the carrageen injection the hind-paw volumes were recorded. The differences between the initial and final paw volume indicated the oedema volume due to inflammation. The percentage inhibitions produced by the drugs or principles were calculated which are directly indicative of the anti-inflammatory activity exerted. The paw volume was measured at 0, 1, 3 and 5 h after injection of carrageenan.

$$\% \text{ Inhibition} \quad \frac{\text{Oedema volume in control - Oedema volume in treated}}{\text{Oedema volume in control}} \times 100$$

Sub-acute anti-inflammatory studies

Cotton-pellet granuloma method

Sub-acute inflammation was produced by the method described by Winter and Portar (1957) and Turner (1965). This method or technique rather reveals the chronic (sub-acute) anti-inflammatory effects of a test substance when it was administered for 7 days in seven divided doses (Meir et al., 1950; Winter and Porter, 1957). Albino rats weighing about 180-200g were divided into 5 groups of 6 animals in each and were kept in separate cages one or two days before commencing the experiments. Using sensitive monoplane balance, which reads the weights to an accuracy of 0.1mg, cotton pellets weighing exactly 10mg each were made. Each cotton pellet was rolled to an identical size. The pellets were sterilized in an autoclave for 45 min. less than 15lbs/inch^2 of steam pressure. The ventral portions of animals were shaved with scissors and swabbed with alcohol. The animals

were anaesthetized with anesthetic ether. Two or 1cm skin incisions were made one on the mid thorax and the other on the mid abdominal region. Using a pair of blunt artery forceps, a small channel was made bilaterally and one cotton pellet was placed in each channel, 1 in the axilla one in each and 2 in the axilla one in each and 2 in the groin, one in each subcutaneously. All the air in the channels was removed by gentle pressing the incisions were closed with stitches. Treatment to the control, positive control and the test groups were initiated as soon as the animals were recovered from anesthesia and continued daily for 7 days.

The dosage, treatment and grouping were done as described in acute anti-inflammatory studies. On the 8th day the animals were sacrificed and the cotton pellets were removed. They were weighed immediately after separating the adjoining and masking subcutaneous fascia. Then they were dried in a hot air oven maintained at 60^{o}C for at least 24 h and weighed. By subtracting dry weight of granuloma cotton with initial by weight, the percentage inhibition of granuloma was calculated. The weight of the cotton pellet before implantation was subtracted from the weight of dried granuloma pellets. The values were expressed as mean ± SEM.

Results and discussion

The ethanolic (50%) extract of *Jasminum sambac* (Var. Bell of India) did not cause any mortality up to 1500mg/kg b.w. and was considered not toxic.

Carrageenan induced hind paw oedema

The results of the anti-inflammatory effect of the 50% ethanolic extract of *Jasminum sambac* (Var. Bell of India) on carrageenan induced oedema in rat's hind paw are presented in Table 1. There was a gradual increase in oedema paw volume of rats in the control (Carrageenan treated). However, in the test groups, the extract showed a significant reduction in the oedema paw volume. As indicated in Table 1, a dose related inhibition of hind paws oedema in third hour was observed. Maximum percentage inhibition was exhibited at 200 mg/kg b.w and it was found to be almost similar to that at dose level of 400 mg/kg. Dichlofenac as reference drug (5 mg/kg orally) produced a highly significant inhibitory effect comparable to tested extract.

Table 1. Effect of 50% ethanolic extract of *Jasminum sambac* on carrageenan induced rat paw oedema.

Drug used	Dose mg/kg	Mean increase in oedema ± SEM					
		1st h	Inhibition (%)	3rd h	Inhibition (%)	5th h	Inhibition (%)
Control	-	1.104 ± 0.026	-	1.509 ± 0.023	-	1.466 ± 0.019	-
Standard	-	0.721*** ± 0.035	34.69	0.535*** ± 0.010	64.54	0.729** ± 0.032	50.27
Leaf extract of *J.sambac* var. Bell of India	100	0.864** ± 0.068	21.73	0.827*** ± 0.027	45.19	0.957* ± 0.051	34.72
	200	0.785*** ± 0.013	28.89	0.701*** ± 0.018	53.54	0.904** ± 0.036	38.33
	400	0.720*** ± 0.043	34.78	0.637*** ± 0.018	57.78	0.867* ± 0.016	40.85

Each value represents the mean ± SEM; n=6; *p< 0.05, **p< 0.01, ***p< 0.001, compared with control.

Cotton pellet granuloma

In sub-acute inflammation model, the weight of the granulation tissue formation was significantly (p<0.001) reduced by the extract (400 mg/kg) and Dichlofenac sodium (Table 2). The extract also showed dose-dependent inhibitory effect on granuloma weight. The percentage of inhibition of the plant extract (400 mg/kg) was40.64% (Table 2). In the present study the validity of this practice was

examined by carrageenan induced paw oedema model and cotton pellet granuloma method. The carrageenan induced paw inflammation has been accepted as a useful phlogiston tool for investigating systemic anti-inflammatory activity of any drug. At a dose of 400 mg/kg showed inhibitory activity in carrageenan induced inflammation. The development of oedema has been described as biphasic. The first phase is due to the release of histamine, 5-HT and kinins in the first hour after injection of carrageenan. A more pronounced second phase is related to the release of prostaglandins like substances in 2-3 h (Brooks and Day, 1991). Hence, the significant anti-inflammatory activity of *J. sambac* (var. Bell of India) could be due to the presence of a flavonoid, which may exert predominant inhibition of inflammatory mediators from phlogogenic stimuli.

Table 2. Effect of 50% ethanolic extract of *Jasminum sambac* oncotton pellet induced granuloma in rats.

Groups	Dose (mg/kg)	Wt. of dry cotton pellet granuloma (mg)	Inhibition (%)
Control (0.75%carboxy methyl cellulose)	5ml/kg	0.155 ± 0.002	-
Dichlofenac sodium	5mg/kg	0.55 ± 0.001***	64.51
Leaf extract of *J. sambac* var. Bell of India	100	0.130 ± 0.005*	16.12
	200	0.110 ± 0.009***	29.03
	400	0.092 ± 0.002***	40.64
Each value represents the mean ± SEM; n=6; *P< 0.05, ***P< 0.001 compared with control.			

In cotton-pellet granuloma model, inflammation and granuloma develop during a period of seven days. This model is the indication for the proliferative phase of inflammation. Sub-acute inflammation involves infiltration of macrophages, neutrophils and, proliferation of fibroblasts (Grover, 1990). Hence, the decrease in granuloma weight indicated the anti-proliferative activity of flavonoids (Koganov, 1999).

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