

ANALGESIC AND ANTI-INFLAMMATORY ACTIVITIES OF *IXORA COCCINEA* FLOWER

ABSTRACT

The present study was an endeavor to evaluate anti-inflammatory and analgesic activity of methanolic extract of *Ixora coccinea* flowers (ICF-ME). The *in vivo* anti-inflammatory was evaluated in rats by using carrageenan-induced paw edema, as an acute anti-inflammatory model. Quantitative estimation of total polyphenolic content of *I. coccinea* flowers was estimated by ICF-ME (100mg/kg) significantly decreased paw volume, after oral administration of ICF-ME in carrageenan injection. ICF-ME also exhibit significant analgesic activity. The response of licking or jumping latency was recorded in seconds by using hot plate method. Presence of phytochemical like flavonoids, glycosides, and tannins in the ICF-ME might contribute to the observed analgesic and anti-inflammatory activity.

Keywords: *I. coccinea* flower, Analgesic, Anti-inflammatory, Carrageenan, Hot plate method.

INTRODUCTION

Ixora coccinea Linn. Family: Rubiaceae, a bushy shrub that has long been a popular hedging plant in subtropical regions of India¹.

From literature review of *Ixora coccinea* it has been found that there is less work done on the flowers and plant is mentioned in ayurveda. *Ixora* freely produce loose, corymbs-like cymes, 2-5" across of red, orange, pink or yellow flowers. The *Ixora coccinea* flower (ICF) is used as an antitumor, hepatoprotective, chemo protective². Flowers are used in Reddened eyes and eruption in children. The flowers mainly constitute cycloartenol ester, lupeol fatty-ester, ursolic acid, oleanolic acid and β - sitosterol³. The leaves mainly constitute of lupeol and are used in dermatological disorder. The flowers are astringent, bitter, sweet, carminative, digestive and constipating. They are useful in dysentery, dysmenorrheal, leucorrhoea, haemoptysis, catarrhal bronchitis, ophthalmopathy, sores and ulcers^{4,5,6}.

The analgesic and anti-inflammatory activity of ICF has not yet been documented. Current drugs for inflammation such as NSAIDs and opiates are not beneficial in all cases, due to their side effects and potency. Hence search for other alternatives seems necessary and beneficial. This study aimed to

investigate *in vivo* anti-inflammatory and analgesic potential of extracts from ICF.

MATERIALS AND METHODS

Collection of Plant Material and Extraction

The plant with red flowers was selected for work. The flowers of *Ixora coccinea* were collected from Nasik district and identified by Dr. P.S.N. Rao, Scientist, Botanical Survey of India, Koregaon road, Pune, who did the conformation of plant. The herbarium of plant specimen has been deposited at B.S. I. Pune. The voucher specimen no ARSI, Reference no. BSI / WC / Tech / 2006 / 667.

The flowers were dried in vacuum oven at 35°C for a week. They (150 gm) were extracted with petroleum ether. The % yield of extract was 1.42 g. Color of extract was yellow and extract was solid and waxy.

The extract was treated with 5% KOH solution and refluxed for 1 hour. After refluxing it was shaken with solvent ether in a separating funnel thrice successively with 50 ml of solvent ether each time. It was made alkali free with distilled water. Solvent ether portion contained unsaponifiable matter^{4,7}.

Successive extraction with methanol yielded 7.6g. Color of extract was dark red and extract was semisolid, sticky and sugary.

Table I: Anti-inflammatory activity of *Ixora coccinea* flower extracts [After 180 minutes]

Group	Drug Treatment	Dose mg/kg Body wt.	Paw volume Displaced (mL)		% Inhibition of Paw Edema
			Mean± SEM		
I	Caragennan	0.1 ml of 1%	1.35±	0.09	-----
II	Ibuprofen	20mg	0.21±	0.03	84.5
III	Pet-ether extract	100mg	0.71±	0.08	47.41
IV	Methanol extract*	100mg/kg	0.43±	0.06	68.15
V	Ethyl acetate extract	100mg/kg	0.63±	0.04	53.34

*significant activity

Table II: Analgesic activity of *Ixora coccinea* flowers

Sr no	Drugs	Latency of paw licking (min)			
		0	30	60	90
1	Vehicle	2.3 ± 0.6	2.5 ± 0.7	2.6 ± 0.4	2.6 ± 0.3
2	Pentazocine(10mg/kg)	2.6 ± 0.8	5.2 ± 0.8	7.3 ± 0.6	5.1 ± 0.6
3	Methanol extract* (100mg/kg)	2.1 ± 0.4	3.8 ± 0.5	5.5 ± 0.6	4.1 ± 0.4
4	Ethyl acetate extract (100mg/kg)	2.5 ± 0.35	3.2 ± 0.2	4.6 ± 0.3	3.9 ± 0.2

*significant activity

Phytochemical Screening

The extract was subjected to preliminary phytochemical screening, for evaluation of major phytochemical constituent such as alkaloids, steroids, polyphenols, saponins, anthroquinones, coumarins and glycosides.

EXPERIMENTAL

The experiment was carried out according to the guidelines of the committee for the purpose of control and supervision of experiments on animals, New Delhi. INDIA. The Institutional Animal Ethical Committee approved the protocol of this study. [CPN / IAEC / 2006/ 01]

Screening of anti-inflammatory activity^{6,7}

Male Wistar rats weighing 150-200 gm were obtained from Bharat Serum and Vaccine, Thane, India and used for the Experiment. The edema in one of the hind paw was induced by injection of 0.1 mL of 0.1% w/V carageenan in PEG into the planter vein.

Volume of the paw was measured plethysmographically by digital water plethysmometer and 3 hours after the injection.

The difference in the volume gives the amount of edema developed. Percent inhibition of the edema between the control groups and compound treated group was calculated and compared with groups receiving the standard drug.

Carageenan induced edema in male rats

Prepared a stock solution of Ibuprofen (20 g/mL) and injected 0.1mL/150 gm of the body weight of the animal.

Test compound – the extracts of *I. coccinea* flowers (Pet-ether and methanolic extract-100mg each).

The animals were weighed and numbered. Mark was made on both the hind paws beyond the tarsal junction, so that every time it was dipped in the mercury column up to the fixed mark to ensure constant paw

volume. The animals were divided into three groups, each comprising of 4 animals.

The Group I- Control Carrageenan treated (Carageenan-1% w/V in PEG)

The Group II- Test extracts (Pet-ether and methanolic extract-100mg each).

The Group III- Test extracts and carageenan treated.

Carrageenan was injected 0.1mL (1% w/V in PEG) in sub planter region in right paw.

Solution of test extracts in PEG were injected intraperitoneally at the dose of 100 mg/kg body weight and challenged with carageenan. The initial paw volume of each rats were noted by mercury displacement method.

The reading of paw displacement volume of control, standard and test were noted at 0, 15,30,60,90,120,150 and 180 minutes.

The percentage inhibition of paw edema was calculated in the rats by the formula:

$$\% \text{ inhibition of paw edema} = 1 - (V_t/V_c) \times 100$$

V_t = volume of paw edema in animal treated.

V_c = volume of paw edema in carageenan treated animals.

Screening for analgesic activity

Animals: Swiss albino mice (male), weighing 20-25g was used.

The animals were housed in a group of six under standard light/dark cycle, food and water. Food was withdrawn 2 hours prior to drugs administration till completion of experiment on the day. The mice were allowed to acclimatize to laboratory conditions.

Hot plate method

The method as described by Wolfe and Mc Donald (1944) was used.

The Albino mice (Haffkine strain) weighing 22-25g were divided into four groups of Six each. First group was kept as control. The second group pentazocine (10mg/kg) was administered orally. To the third and fifth group test extracts Pet-ether and Methanol, 100mg/kg each in dose of 100mg/kg were administered. After one hour of administration, animals were placed gently on hot plate, Medcraft analgesiometer Eddy's hot plate, mark III set at 55°C temperature. The response of licking or jumping latency was recorded in seconds. The animals were removed from hot plate soon after they exhibited jumping. Cut off time was 20 seconds.

RESULTS

Phytochemical screening ⁵

ICF-ME showed the presence of flavonoids, glycosides and tannins.

Pet-ether showed the presence of, sterols, carotenoids and triterpenoids.

Anti-inflammatory study

The results obtained with ICF Extracts and ibuprofen in the Carageenan-induced edema test are shown in (Table I) ICF extracts exhibited significant inhibition of inflammation at 100mg/kg.

Analgesic study

The results obtained with ICF and pentazocine test are shown in Table II.

ICF extracts exhibited significant analgesic activity at 100mg/kg.

% Analgesia was calculated using following formula

$$\% \text{ analgesia} = \frac{T_t - T_c}{20 - T_c} \times 100$$

where,

Tt= Time required to lick a paw in control animal

Tt= Time required to lick a paw in treated animal

DISCUSSION

In the present studies, phytochemical and pharmacological investigations of *Ixora coccinea* flowers were carried out. The extraction of flowers was carried out by successive extraction method with Pet-ether and methanol. All the extracts showed significant analgesic and anti-inflammatory activities. The plant can be developed as good hepatoprotective, anti-inflammatory and analgesic agent.

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REFERENCES

1. Kirtikar., Basu.: Indian Medicinal Plants vol.II (second edition) 1984, Bishen Singh Mahendra Pal Singh, 23-A, New Connaught place, Dehradun, 848-849.
2. Rastogi.,Malhotra.:Compedium of Indian Medicinal Plants,Vol I,67,vol II, 116 vol. III113-114, vol.IV,129-130
3. Zacharieh R, Nair Sudhakaran C.R., Panikar: Anti-inflammatory and antimiotic activities of lupeol isolated from leaves of *Ixora coccinea* Linn. **Ind J Pharm. Sci.** 1994, 6(2), 129-132.
4. Government of India, The Indian Pharmacopoeia: 1996 vol. II, A-52, A-54, A-089, 2002, 405-407, Controller, CSIR, New Delhi.
5. Vimala R., Nagarjan S., Alam M., Susan T., Joy S.: Anti-inflammatory and antipyretic activity of *Michelia champaca* Linn. (White variety), *Ixora brachiata* Roxb. and *Rhynchosia Cana* (Wild) D.C. flower extract. **Ind J Exp. Biol.** 1997, 35(12), 1310-4.
6. Kokate C.K., Purohit A.P. and Gokhale S.B.: A Text Book of Pharmacognosy (Twenty seventh edition) 2005, Nirali Prakashan, Pune, 255-256.
7. Brain, K.R.: The Practical Evaluation of phytopharmaceuticals (first edition) 1975, John's Wright and Sons, London, 103.

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Indian Drug Manufacturers' Association Event Calendar

Sr.No	Date	Organizer	Event	Venue
1	24 th – 26 th April 2013	IDMA & Pharmexcil	IPHEX 2013	Bombay Exhibition Centre, Mumbai
2	24 th – 26 th April 2013	IPMMA	Pharma Pro & Pack 2013	Bombay Exhibition Centre, Mumbai
3	10 th – 12 th July 2013	Reed Exhibitions Japan Ltd	7 th Pharma Japan 2013	Tokyo Big Sight, Japan
4	27 th -28 th September 2013	IDMA	16 th Pharmaceutical Analysts Convention (PAC) 2013	Mumbai
5	7 th – 9 th November 2013	Reed Exhibitions China Ltd	70 th API China	Wuhan, International Expo Centre, China

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