Antiinflammatory activity of *Curcuma aromatica* Salisb and *Coscinium fenestratum* Colebr: A comparative study

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**ABSTRACT**

The ethanolic extracts of two traditionally used medicinal plants namely *Curcuma aromatica* Salisb and *Coscinium fenestratum* Colebr were investigated for antiinflammatory activity using the carrageenan-induced rat paw edema method. The ethanolic extracts of both the plants and the standard drug diclofenac sodium exhibited significant antiinflammatory activity in terms of inhibition of paw edema. It was found that ethanolic extracts of *C. aromatica* was more potent than *C. fenestratum*. The preliminary phytochemical analysis of extracts showed the presence of tannins and flavonoids. The observed activity could be mainly due to the presence of phytoconstituents such as flavonoids.

**Keywords:** *Curcuma aromatica* Salisb, *Coscinium fenestratum* Colebr, Soxhlet extraction, Antiinflammatory activity, diclofenac sodium

**INTRODUCTION**

The traditional medicines hold a great promise as a source of readily available effective drugs to the people, particularly in developing countries, including India. The origin of many effective drugs is found in the traditional medicine practices and in view of this several workers have undertaken studies pertaining to testing of folklore medicinal plants for several pharmacological activities. *Curcuma aromatica* Salisb, belonging to the family Zingiberaceae, is distributed throughout India and is widely used as a flavouring agent, condiment and a source of yellow dye. The rhizomes of *C. aromatica* possess a reputed property to promote health conditions by arresting ageing and have immunomodulatory effects. From ancient times, it is being used as an antibiotic against various microbial infections. Historically, rhizomes are used as tonic, carminative, and externally in combinations with astringents, bitters and aromatics to bruises, in sprains and in snake-bite. They are also used for skin eruptions and infections and to improve complexion. *Coscinium fenestratum* belongs to the family Menispermaceae and is a critically endangered dioecious medicinal liana found in Western ghats of India. The stem of the plant is used in curing several diseases and disorders like diabetes, wounds and ulcers, fever, jaundice, snake bite, piles etc in ethnomedicine. The chief constituent of *Coscinium* is the yellow crystalline alkaloid, berberine. The present study was undertaken to investigate the antiinflammatory potential of ethanol extracts of *C. aromatica* and *C. fenestratum* on carrageenan induced rat paw oedema.

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**MATERIALS AND METHODS**

**Collection and Identification**

The stem of *C. fenestratum* (voucher no. SRNMNC/Bo/Cf/1452) and rhizome of *C. aromatica* (voucher no. SRNMNC/Bo/Ca/1463) were purchased from local shops of Udupi city, Karnataka. The specimens were authentically identified in Dept. of Botany, S.R.N.M.N College of Applied Sciences, Shivamogga and voucher specimen were deposited in the department for future reference.

**Extraction and phytochemical screening**

The plant materials were powdered mechanically and subjected to soxhlet extraction using ethanol for about 48 hours. The extracts were filtered, concentrated in vacuum under reduced pressure using rotary flash evaporator and dried in the desiccator and the extracts were kept in refrigerator until use. The extracts were screened for phytoconstituents using standard procedures.

**Animals**

Wistar strain rats of either sex weighing 150-200g were housed in standard polypropylene cages and kept under controlled room temperature (24°C; relative humidity 60-70%) in a 12h light-dark cycle. The rats were given a standard laboratory diet (Hindustan Lever Ltd., Bangalore) and water *ad libitum*. Food was withdrawn 12h before and during the experimental hours. All experimental protocols were approved by the institutional animal ethics committee.

**Acute Toxicity studies**

Acute Toxicity study was conducted and the LD₅₀ (Lethal dose) for each of the extract was determined. LD₅₀ of was found to be 80mg/kg and 100mg/kg for *C. fenestratum* and *C. aromatica* respectively. One tenth of the LD₅₀ was selected as maximum dose for the
evaluation of antiinflammatory activity.

**Antiinflammatory activity by Paw oedema method**

The animals were divided into four groups (6 animals in each group) as shown below.

Group I: Control, 0.1% Tween 80 (10ml/kg)
Group II: Ethanolic extract of *C. aromatica* @ 10mg/kg p.o
Group III: Ethanolic extract of *C. fenestratum* @ 8mg/kg p.o
Group IV: Standard drug diclofenac sodium @ 25mg/kg p.o

The antiinflammatory activity of ethanolic extracts and standard drug was studied by Carrageenan-induced rat hind paw oedema 7, measured by plethysmograph 8,9. The standard drug and ethanolic extracts were administered in the form of suspension of water containing 0.1% Tween-80 as suspending agent. The standard drug and the ethanolic extracts were administered to respective groups of animals. The volume of paw oedema was measured in control, standard and extract treated groups accordingly 0, 1, 2 and 3h after subplantar injection of 0.1ml of 1% carrageenan. The percent inhibition of oedema was calculated 10.

**RESULTS**

In the acute inflammation model, injection of carrageenan suspension produced a local oedema reaching its maximum at 3 h in the control group of animals. The antiinflammatory effect of the extracts of *C. fenestratum* and *C. aromatica* at the end of third hour was found to be 34.48% and 35.18% respectively which were found to be lesser than the standard drug Diclofenac that caused 40.74% inhibition of paw oedema. Among extracts, *C. aromatica* was found to have marked antiinflammatory potential than *C. fenestratum*. The preliminary phytochemical analysis of ethanol extracts showed the presence of flavonoids and tannins in both the extracts.

**Table.1. Antiinflammatory effect of ethanol extracts of *C. aromatica* and *C. fenestratum***

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose (mg/kg p.o)</th>
<th>Paw volume in ml at different time intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Control</td>
<td>10ml/kg</td>
<td>0.875±0.025</td>
</tr>
<tr>
<td>Standard</td>
<td>25</td>
<td>0.975±0.025</td>
</tr>
<tr>
<td><em>C. fenestratum</em></td>
<td>8</td>
<td>0.900±0.040</td>
</tr>
<tr>
<td><em>C. aromatica</em></td>
<td>10</td>
<td>0.950±0.028</td>
</tr>
</tbody>
</table>

n = 6 in each group; p = 0.05 significant; values in parantheses is % inhibition of paw volume

**DISCUSSION**

Carrageenan-induced hind paw edema is the standard experimental model for 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 systemic effects. Moreover, the experimental model exhibits a high degree of reproducibility 8. Carrageenan-induced edema 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 reacting substances which peak at 3 hours 9. The ability of the extract to inhibit carrageenan induced paw edema is suggestive of its antiinflammatory potential. Antiinflammatory effects have been observed in flavonoids as well as tannins 10. Flavonoids such as quercetin are known to be effective in reducing acute inflammation 11. Certain flavonoids possess potent inhibitory activity against a variety of enzymes such as protein kinase C, protein tyrosine kinases, phospholipase A2, phosphodiesterases and others 12. The antiinflammatory effect of the extract may be due to the presence in the extract of flavonoids, tannins etc either singly or in combination. Isolation of the active constituents responsible for the observed effect can reveal the possible mechanism of action responsible for antiinflammatory activity.

**REFERENCES**