ANTIINFLAMMATORY ACTIVITY OF CURCUMA AMADA ROXB. IN ALBINO RATS

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SUMMARY

Objectives: To study the antiinflammatory activity of Curcuma amada rhizome extract in albino rats.
Methods: Rhizomes of Curcuma amada were extracted and subjected to spectroscopic studies. The extract was screened for antiinflammatory activity in albino rats using acute carrageenan paw oedema and chronic granuloma pouch model.
Results: The extract showed presence of chemical compounds with hydroxyl, ester, carbonyl and olefin functionalities and exhibited dose dependent antiinflammatory activity in acute and chronic models.
Conclusions: The extract of Curcuma amada rhizomes showed antiinflammatory activity in acute and chronic administration in albino rats.

KEY WORDS Curcuma amada           albino rats           antiinflammatory activity

INTRODUCTION

The plants belonging to Zingiberaceae family are found to be a rich source of substances of phytochemical interest. Number of plants from this family are used in traditional system of medicine. Curcuma amada is one member of this family which is traditionally used as carminative and stomachic. Literature survey indicates the presence of multiple chemical constituents in this rhizomes. However, very few references about the evaluation of pharmacological activity of the extract are available indicating its carminative, stomachic and CNS activity. The extract exhibited hypercholesteremic effect in rabbits and showed presence of antibiotic principle with strong inhibitory activity on Aspergillus niger and Trichophyta rubrum. The rhizomes are used for the treatment of inflammatory conditions as a household remedy on empirical basis. It was, therefore, decided to screen their extract for antiinflammatory activity using animal models.

MATERIALS AND METHODS

Fresh rhizomes (5 kg) were collected directly from the field and were authenticated by the Botany Group. They were then cut into small pieces and immersed into ethyl alcohol. Extracts were drawn (7.5 L) at the intervals of 24 hours till the extract was almost colourless (6 x 7.5 L). The combined extracts were concentrated under reduced pressure when the crude extract (34.3g, 0.686%) was obtained as a yellowish, thick and fragrant liquid. TLC of the crude extract (n-hexane-ethyl acetate, 6:4) showed a streak. The spectroscopic analysis of this extract was carried out as follows: Ultra-violet (UV) spectra were recorded on Chemito 2600 spectrascan UV / visible spectrophotometer. Infra Red (IR) spectra were recorded as neat liquid films on Shimadzu IR 470 Spectrophotometer. Proton Magnetic Resonance (PMR) spectra were recorded on Hitachi R-1200 NMR Spectrometer using tetramethyl silane as an internal standard. Chemical shifts are reported in ppm units.

The pharmacological screening of the crude extract was carried out using standard protocols. The crude extract was suspended in 1% carboxy methyl cellulose (CMC) for administration to albino rats. Albino rats (HA Strain) of 150-200 g were used for present investigation. They were kept in polypropylene cages in an air-conditioned area at 25 ± 2°C in 10-14 h light dark cycle. They were provided with Amrut brand balanced feed and tap water ad libitum.
Table 1. Acute antiinflammatory activity of Curcuma amada extract (C.A.) on carrageenan induced rat paw oedema.

<table>
<thead>
<tr>
<th>Group</th>
<th>Percentage of inflammation at time (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Control</td>
<td>39.51 ± 4.67</td>
</tr>
<tr>
<td>C.A. Extract (mg/kg)</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>200</td>
</tr>
<tr>
<td>Indomethacin (mg/kg)</td>
<td>10</td>
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</table>

*p < 0.05 as compared to control group.
Values are mean ± SEM; n = 6 in each group.

The ethanol extract of C. amada was devoid of any mortality or change in behaviour upto 1 g/kg orally in albino rats. Based on this observation maximum dose of 200 mg/kg orally was used for acute treatment in following experiments.

Carrageenan induced rat paw oedema: Twenty four rats were divided into 4 groups of 6 rats each for various treatments as shown in Table 1. Subsequently 30 min after above treatment, 0.1ml of 1% carrageenan was injected subcutaneously into the planter region of right hind paw to induce oedema. The paw volume was measured initially and at 1, 2, 3 and 4 h after carrageenan injection using pithesmographic method of Harris and Spencer. Percentage inflammation was calculated for comparison.

Cotton pellet granuloma: Cotton pellet granuloma was induced according to the method of D’Arcy et al. Sterilised cotton pellets each weighing 10mg were implanted in both axilla and groin of each rat under light ether anaesthesia. Twenty four rats were divided into four groups as shown in Table 2 for various treatments for five days. Subsequently, on 6th day all pellets were dissected out under ether anaesthesia and dried at 70°C for 6 hours and weight of each granuloma was determined.

Statistical analysis: The data were analysed using one-way analysis of variance. Post-hoc comparisons using Scheffe’s test were carried out for the analysis to determine significant overall effects (P<0.05).

RESULTS

The ethanol extract showed following characteristic features in spectroscopic studies.

The UV spectrum (C6H5OH) showed absorption at λ = 236.8 nm (weak chromophore). Its IR spectrum (Neat) showed bands at 3400 (hydroxyl), 1740 and 1360 (ester), 1720 (carbonyl) and 1640 cm⁻¹ (olefin). Thus spectral data of the crude extract showed the absence of conjugated chromophore and presence of hydroxyl, carbonyl, ester and olefinic functionalities in it.

Its PMR spectrum showed prominent signals around 1 δ (methyl, methylene and methine protons) and also around 4.0 δ (ester) and 5.2 δ (olefinic protons) confirming assignments made by IR spectrum.

Carrageenan - induced rat paw oedema: The extract as well as indomethacin showed antiphlelogastic activity. This antiinflammatory activity was dose-dependent and found to be statistically significant at the higher concentration, 200 mg/kg, (Table 1). The antiinflammatory activity of indomethacin, a standard reference drug, was also found to be significant.
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ACKNOWLEDGEMENT

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REFERENCES


Table 2. Effect of Curcuma amada extract (C.A.) on cotton pellet induced granuloma in albino rats

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Weight of granuloma (mg)</th>
<th>Pairwise mean difference*</th>
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<tr>
<td>Control</td>
<td>36.433 ± 2.369</td>
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</tr>
<tr>
<td>C.A.Ext.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 mg/kg</td>
<td>25.316 ± 0.558</td>
<td>11.116 ± 2.217</td>
</tr>
<tr>
<td>80 mg/kg</td>
<td>22.766 ± 1.098</td>
<td>13.666 ± 2.217</td>
</tr>
<tr>
<td>Indomethacin 20.216 ± 1.642 (5mg/kg)</td>
<td>16.216 ± 2.217</td>
<td></td>
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Values are mean ± SEM; n=6 in each group. One way ANOVA revealed F=20.765, P=0.001 indicating significant difference between groups. Further multiple comparisons using Scheffe’s test showed significant difference among treated and control groups. *Mean difference (±SEM) is between control and each treatment using Scheffe’s test. aP<0.001

Cotton pellet granuloma: There was dose dependant reduction in granular tissue formation in extract and indomethacin treated rats as shown in Table 2. The activity was found to be statistically significant for the dose ranges used.

DISCUSSION

The crude ethanol extract showed presence of multiple chemical constituents with presence of hydroxyl, ester, carbonyl and olefinic groups. The ethanol extract of C.amada is devoid of toxicity upto 1 g/kg in albino rats. The extract showed dose dependent antiinflammatory activity, which was found to be statistically significant at higher concentration in acute carrageenan induced rat paw oedema model. However, this activity was less potent as compared to indomethacin. This activity appears to be significant in early phases of inflammation in which various biochemicals, viz. histamine, 5-HT, various kinins are involved. In the chronic model of cotton pellet implantation the activity was dose dependant and significant reduction in granular tissue formation was recorded. The results were significant when analysed statistically. Thus, extract shows antiinflammatory activity at various acute phases of inflammation and on formation of granular tissue.

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