Anti-Inflammatory Activity of *Carallia brachiata* Bark

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Introduction

*Carallia brachiata* bark (Rhizophoraceae) commonly known as Karalli is large ever green ornamental tree, with a straight cylindrical bole, 16-33m in height and up to 2m in girth, distributed almost through out India up to an altitude of 1,300m and in tidal creeks of Andaman. In India, bark has been traditionally used for treating itch, oral ulcers, inflammation of throat and stomatitis. In Indo China, it is used for treating itch (vol III). From bark proanthocyanidins named carallidin, mahuannin and para hydroxy benzoic acid were reported. Carallidin and Mahuannin were reported to possess antioxidant activity (Phuwapraisirisanet et al., 2006).

The bark has not been explored for any pharmacological activity so far. Hence present investigation was undertaken to screen the bark for In-vitro anti-inflammatory activity.

Materials and Methods

*Carallia brachiata* stems were collected from Tirupathi forest ranges, A.P. India in September 2006. The plant was identified and authenticated by Prof. K. Madhav Chetty, Department of Botany, Sri Venkateshwara University, Tirupati, India. A voucher specimen (CB-10-06) is maintained in phytochemistry and pharmacognosy Dept. of G. Pulla Reddy College of pharmacy, Hyderabad, A.P, India. The bark was separated from stems, air dried and grounded to coarse powder and extracted successively with petroleum ether (60-80°C), ethyl acetate and methanol by cold maceration. All the extracts were concentrated in vacuum using Rotary Flash Evaporator. They were further concentrated and dried in desicator. The yield of petroleum ether, ethyl acetate and methanol extracts were 0.62, 3.34 and 6.21 percent respectively. Qualitative chemical tests were performed for phytochemical constituents (Ansari et al., 2005-2006, Kokate, 1994) Steroids, triterpenoids, phenols, flavonoids, carbohydrates, fixed oils and fats were found to be present.

Male wistar rats (150-180g) were used to carryout the anti-inflammatory activity. They were maintained under standard environmental conditions and have free access to feed (Nutrient animal feed, Rayan Biotechnology Pvt. Ltd) and water *ad libitum* during quarantine period. The institutional animal ethics committee of G. Pulla Reddy College of Pharmacy, Hyderabad, A.P, India approved the animal experimental protocol.

The ethyl acetate and methanol extracts were evaluated for anti-inflammatory activity using carrageenan induced rat paw edema method (Winter et al., 1962). The animals were fasted overnight before experimentation, but had been allowed free access to water. Rats were divided into eight groups of six animals in each. Group I served as a control, received 1ml/kg of 2% gum acacia orally. Group II served as a standard, received diclofenac sodium 10mg/Kg.

Group III to VIII received ethyl acetate and methanol extracts at a dose of 200, 300 and 400 mg/kg in 2% gum acacia suspension by oral gastric intubation.

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After one hour, edema was induced in all the animals by injecting 0.1ml of freshly prepared 1\% carrageenan in normal saline in to the sub plantar region of the right hind paw. The paw volume was measured with Plethysmograph at 0, 1, 2, 3 and 4 hours after carrageenan injection. The percentage of inhibition of edema was calculated using formula:

\[
\%\ \text{Inhibition of edema} = \left(1 - \frac{V_t}{V_c}\right) \times 100
\]

Where \(V_t\) = Paw volume in test group animals.
\(V_c\) = Paw volume in control group animals.

The results were reported as mean ± S.E.M. The significance of results was calculated using student ‘t’ test and was considered statistically significant at *P < 0.05.

**Table 1.** Anti-inflammatory activity of *C. brachiata* on carrageenan induced rat paw edema.

<table>
<thead>
<tr>
<th>Group/ Treatment</th>
<th>Dose (mg/kg, p. o)</th>
<th>Mean paw edema (ml) ± S.E.M</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 hr.</td>
<td>2 hr.</td>
</tr>
<tr>
<td>GROUP I /Control</td>
<td>-</td>
<td>0.2 ± 0.05</td>
</tr>
<tr>
<td>GROUP II / Diclofenac sodium</td>
<td>10</td>
<td>0.05 ± 0.01 (80 %)</td>
</tr>
<tr>
<td>GROUP III / Ethyl acetate extract</td>
<td>200</td>
<td>0.16 ± 0.04 (20%)</td>
</tr>
<tr>
<td>GROUP IV / Ethyl acetate extract</td>
<td>300</td>
<td>0.125 ± 0.02 (37.5%)</td>
</tr>
<tr>
<td>GROUP V / Ethyl acetate extract</td>
<td>400</td>
<td>0.075 ± 0.11 (62.5%)</td>
</tr>
<tr>
<td>GROUP VI / Methanol extract</td>
<td>200</td>
<td>0.125 ± 0.03 (37.5%)</td>
</tr>
<tr>
<td>GROUP VII / Methanol extract</td>
<td>300</td>
<td>0.08 ± 0.03 (60%)</td>
</tr>
<tr>
<td>GROUP VIII / Methanol extract</td>
<td>400</td>
<td>0.09 ± 0.02 (55%)</td>
</tr>
</tbody>
</table>

Results are mean ± S.E.M. (n=6) *P < 0.05, compared to control.
Results and Discussion

The results of Anti-Inflammatory activity revealed that ethyl acetate and methanol extracts exhibited dose dependent activity. At the dose of 400mg/kg the ethyl acetate and methanol extracts have shown maximum inhibition of the edema (75% and 67% respectively) as compared to the inhibition of edema (70%) shown by the standard drug diclofenac sodium. The detailed results are shown in table.

Carrageenan induced paw edema is most widely used acute inflammatory model for studying anti-inflammatory activity and it includes two phases. First phase occurs within an hour of injection of phlogistic agent and is mediated through release of histamine, serotonin and kinins. While the second phase which can be measured around 3 to 4 hours is related to release of prostaglandins (Brooks et al., 1991). In the present study ethyl acetate and methanol extract showed slight inhibition of inflammation in first phase and maximum inhibition is observed in second phase, which is mainly due to release of prostaglandins. The possible anti-inflammatory effect may be due to inhibition of cyclooxygenage enzyme which catalyzes the biosynthesis of prostaglandins and thromboxane from arachidonic acid. There are reports that flavonoids possess anti-inflammatory activity (Ferrandiz et al., 1991, Ballesteros et al., 1995) and some of them also act as phospholipase inhibitors (Fowzy et al., 1988). Such inhibitors are able to decrease the inflammatory response to Carrageenan in rats (Mikayw et al., 1993, Aitchdürfoun et al., 1996).

In the present study also maximum anti-inflammatory activity of ethyl acetate and methanol extracts of *C. brachiata* may be due to presence of flavonoids as evident by phytochemical screening. In conclusion, it is clear that anti-inflammatory activity of *C. brachiata* supports its use given in traditional medicine to reduce inflammation. However, there is need to isolate compounds and establish the exact mechanism of action which is responsible for anti-inflammatory activity.

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References


