Assessment of Anti-Inflammatory and Analgesic Activities of Callicarpa Macrophylla Vahl. Roots Extracts

Corresponding Author:
Mr. Rajeev K Singla,
Assistant Professor & Vice Principal, Sadbhavna College of Management & Technology, Raikot, 124001 - India

Submitting Author:
Mr. Rajeev K Singla,
Assistant Professor & Vice Principal, Sadbhavna College of Management & Technology, Raikot, 124001 - India

Article ID: WMC003366
Article Type: Research articles
Article URL: http://www.webmedcentral.com/article_view/3366
Subject Categories: PHARMACOLOGY
Keywords: Callicarpa macrophylla; Analgesic; Anti-inflammatory; Roots.

How to cite the article: Yadav V, Jayalakshmi S, Singla RK, Patra A, Khan S. Assessment of Anti-Inflammatory and Analgesic Activities of Callicarpa Macrophylla Vahl. Roots Extracts. WebmedCentral PHARMACOLOGY 2012;3(5):WMC003366

Copyright: This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Source(s) of Funding:
None

Competing Interests:
None

Additional Files:
Manuscript
Illustrations
Assessment of Anti-Inflammatory and Analgesic Activities of Callicarpa Macrophylla Vahl. Roots Extracts

Author(s): Yadav V, Jayalakshmi S, Singla RK, Patra A, Khan S

Abstract

Callicarpa macrophylla, an indigenous plant of India, had been the plant of study for the current research work. Aqueous as well as ethanolic extracts of its roots (at two concentrations 200 & 400 mg/kg) were evaluated for its analgesic and anti-inflammatory potentials using tail immersion test and carrageenan paw edema method in albino rats respectively. Aqueous extract of roots are having better analgesic activity than that of its ethanolic extract. Whereas ethanolic root extract have superior anti-inflammatory spectrum than aqueous one. Results are highly promising and ascertain that roots of C. macrophylla have analgesic and anti-inflammatory potential, comparable to that of standards.

Introduction

The Process of drug discoveries/inventions is elaborate, requiring, on an average 8 to 10 years and costing millions to reach a new drug to the market[1]. At present, approximately 25% of drugs in modern pharmacopoeia were derived from plants (phytomedicines) and many others were synthetic analogues built on the prototype compounds isolated from plants. Indian folk medicine comprises of numerous prescriptions for therapeutic purposes such a healing of wounds, inflammation, skin infections, leprosy, diarrhea, scabies, venereal diseases, ulcers, snake bite etc[2-4].

Callicarpa macrophylla Vahl. (fam-Verbenaceae) is an erect shrub which is globally distributed across India, Nepal, Bhutan, Myanmar, South East Asia, and China[5]. Medicinal Plants are capable of synthesizing an overwhelming variety of low – molecular weight organic compounds called secondary metabolites, usually with unique and complex structures[6]. Interest in the roots of this plant C. macrophylla has been heightened by reports of its traditional uses as anti-pyretic, analgesic, anti-ulcer, gastric stimulants etc[7-9].

Keeping this views in mind, aim of current research work was to evaluate analgesic and anti-inflammatory potential of C. macrophylla roots.

Materials and Methods

Collection & Authentication of Plant Material

The drugs were collected from Banaras Hindu University campus, Varanasi and authenticated by Dr. V.K. Joshi, Dean of Faculty of Ayurveda, Institute of Medical Science, B.H.U., Varanasi and also through National Botanical Research Institute (NBRI), Lucknow. A Voucher specimen of all the plants has been preserved in the Department of Pharmacognosy, College of Pharmacy, IFTM, Moradabad, for further references. The collected leaves were shade dried 15 days and size reduced by laboratory grinder in to coarse powder. The air dried coarse powder is used for preparation of extract.

Preparation of Extracts

The ethanolic and aqueous extracts were prepared according to the standard procedure[10]. The filtered, extracts were dried in a vacuum evaporator and aqueous & alcoholic extracts were kept in desiccators until further use.

Animals

Male / female albino rats weighing between 120 to150 grams, from Animal House, College of Pharmacy, IFTM, Moradabad, were divided in ten groups of six animals each. The animals were kept in polypropylene cages, under standard condition of 12:12 light and dark cycle.

Evaluation of Analgesic Activity using Tail Immersion Model

Rats (six per group) were used. Rats was administered orally with vehicle (3ml/kg), pentazocine (30mg/kg), ethanolic, aqueous extract (200 and 400 mg/kg) of roots. The distal part of tails (3c.m) of the animals was immersed in hot water at a temperature of 55±0.5°C. The time taken to withdraw the tail was noted as reaction time with a stopwatch. A cut off time of 10 sec was maintained at 55 ±0.5°C to prevent tissue damage. The reaction time was measured at 0, 15, 30, 45 and 60 min after treatment, respectively.
Evaluation of Anti-inflammatory Activity Using Carrageenan Paw Edema Method

Experimentally inflammation was produced by carrageenan paw edema method in albino rats[5,11]. A volume of 0.01 ml of 1% (w/v) carrageenan suspension in (0.9 % w/v sodium chloride) was injected through a 26-gauge needle into the plantar side of the left hind paw. The prepared drug samples 200 mg/kg, 400 mg/kg of the ethanolic and aqueous extract orally were administered one hour before the carrageenan injection. The standard drug Diclofenac sodium was given orally in dose of 20mg/kg. Tween 80 (1% v/v) was used as suspending agent. The volume of the paw was measured at 60, 120, 180 and 240 minutes after injection. The ankle joint of the rats was marked with permanent marker and the paw was dipped in the mercury. The volume of hind paw of the rats up to the ankle joint was measured plethysmographically by the mercury displace method. The percent inhibition was calculated by following formula-

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

Where, Vt and Vc are the mean change in paw volume of treated and control rats respectively.

Data analysis and statistics

The values were expressed as mean ± standard error mean (SEM). Statistical analysis of the data was carried out by two way ANOVA followed by bonferroni test to determine the significant between two groups p<0.05 was considered significant.

Results and Discussion

A significant reduction of the painful sensation due to tail immersion in warm water was observed followed oral administration of the ethanolic and aqueous extract at dose of 200, 400mg/kg of leaves and roots of \textit{C. macrophylla} Vahl. The effect was found to the dose dependent. In this model, higher dose of the aqueous extract (400mg/kg) at an interval of 60 min has exhibited better analgesic activity than the standard drug. Representation of result of analgesic activity was shown in Table 1 & Figure 1.

Several flavonoids isolated from medicinal plant have been discovered to possess significant analgesic effects (Gulnur et al., 2004 ;). The analgesic activity of ethanolic, aqueous extract of roots of \textit{C. macrophylla} Vahl. may be due to the presence of flavonoids compound.

Table 1 & Figure 1

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose (mg/kg)</th>
<th>Average tail withdrawing time (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 min</td>
<td>15 min</td>
</tr>
<tr>
<td>Control</td>
<td>-</td>
<td>4.11 ± 0.20</td>
</tr>
<tr>
<td>Pentazocine</td>
<td>30</td>
<td>4.52 ± 0.20</td>
</tr>
<tr>
<td>REE</td>
<td>200</td>
<td>4.20 ± 0.39</td>
</tr>
<tr>
<td>RAE</td>
<td>200</td>
<td>4.02 ± 0.31</td>
</tr>
<tr>
<td></td>
<td>400</td>
<td>3.99 ± 0.20</td>
</tr>
</tbody>
</table>

Table 2 Effect of ethanolic, aqueous extract of \textit{C. macrophylla} Vahl. leaves and roots on Carrageenan induced paw edema in rats

Carrageenan has been widely used as a noxious agent able to induce experimental inflammation for the screening of compounds possessing anti-inflammatory activity. This phlogistic agent, when injected locally into the rat paw, produced a severe inflammatory reaction, which was discernible within 30 min. The development of edema induced by carrageenan corresponds to the events in the acute phase of inflammation, mediated by histamine, bradykinin and prostaglandins produced under an effect of cyclooxygenase. (Borgi et al., 2007).

The ethanolic and aqueous extracts (200 mg/kg, 400
mg /kg) of root of *Callicarpa macrophylla* showed significant (p< 0.05) anti-inflammatory effect in the acute phase of the inflammation process as compared with standard drug, Diclofenac sodium (20 mg/kg) body wt. as shown in Table 2 & Figure 2. Further, the ethanolic and aqueous extracts were found to contain carbohydrates, steroids, flavonoids and tannins, through preliminary photochemical screening. The anti-inflammatory activity may be due to one/more group of above Phytoconstituents which may cause inhibition of histamine, serotonin or prostaglandin synthesis.

**Acknowledgment**

Authors would like to express their gratitude towards the management of IFTM & Head, College of Pharmacy for providing financial support to execute this research plan.

**Declaration of Funding and Competing Interests**

This research was solely funded by Management, IFTM, U.P, India. Authors declare no competing interests.

**References**

Illustrations

Illustration 1

Figure 1 Effect of ethanolic and aqueous extract of C. macrophylla Vahl. root on pain using tail immersion test in rats

REE-1, Roots ethanolic extract 200 mg; REE-2, Roots ethanolic extract 400 mg; RAE-1, Roots aqueous extract 200 mg; RAE-2, Roots aqueous extract 400 mg.
Illustration 2

Figure 2 Effects of ethanolic and aqueous extract of C. macrophylla Vahl. roots on Carrageenan-induced paw oedema in rats

**Anti-inflammatory Activity of C. macrophylla roots**

![Graph showing anti-inflammatory activity](image)

**REE-1**, Roots ethanolic extract 200 mg; **REE-2**, Roots ethanolic extract 400 mg; **RAE-1**, Roots aqueous extract 200 mg; **RAE-2**, Root aqueous extract 400 mg.
Disclaimer

This article has been downloaded from WebmedCentral. With our unique author driven post publication peer review, contents posted on this web portal do not undergo any prepublication peer or editorial review. It is completely the responsibility of the authors to ensure not only scientific and ethical standards of the manuscript but also its grammatical accuracy. Authors must ensure that they obtain all the necessary permissions before submitting any information that requires obtaining a consent or approval from a third party. Authors should also ensure not to submit any information which they do not have the copyright of or of which they have transferred the copyrights to a third party.

Contents on WebmedCentral are purely for biomedical researchers and scientists. They are not meant to cater to the needs of an individual patient. The web portal or any content(s) therein is neither designed to support, nor replace, the relationship that exists between a patient/site visitor and his/her physician. Your use of the WebmedCentral site and its contents is entirely at your own risk. We do not take any responsibility for any harm that you may suffer or inflict on a third person by following the contents of this website.