EVALUATION OF ANTI-INFLAMMATORY ACTIVITY OF AQUEOUS EXTRACT OF CASSIA FISTULA FRUIT PULP ON ACUTE INFLAMMATION ON ALBINO RATS

Dr. Mitali Das
MBBS, MD Associate Professor of Pharmacology, Assam Medical College, Dibrugarh, Assam.

Dr. Nilotpal Barua
MBBS, MD Associate Professor of Pharmacology, Gauhati Medical College, Guwahati, Assam.

ABSTRACT

The aim of the study was to evaluate the anti-inflammatory activity of aqueous extract of Cassia fistula fruit pulp against carrageenan induced acute inflammation in albino rats. Cassia fistula fruits were collected, washed, peeled off and after separating seeds the pulp was boiled with distilled for 30 mins, kept for 3 days and then filtered, concentrated. Oral toxicity test was done according to OECD guidelines. Anti-inflammatory activity was evaluated by carrageenan induced rat paw oedema method. Albino rats of either sex weighing 100-200gmms were divided into 5 groups with 6 animals in each group. Group A received normal saline 10 ml/kg. Test groups B, C, D received aqueous extracts of Cassia fistula fruit pulp at the dose of 50, 100, 200 mg/kg body weight respectively. Group E received Aspirin (100mg/kg). Aqueous extracts of Cassia fistula fruit pulp showed significant (p< 0.01) anti-inflammatory activity when compared to the control.

KEYWORDS:

Anti-inflammatory, Cassia fistula, carrageenan, rat paw oedema, Aspirin.

Introduction

Inflammation plays an important role of body defense mechanism against foreign agents which try to invade the body. It is a complex process. Inflammation by involving innate immune components with multiple effectors like leucocytes, mast cells, macrophages and locally produced cytokines tries to protect, repair, and remodel tissues. It has systemic response and local response. Though these inflammatory responses are usually beneficial, but often drug therapy is needed to suppress and prevent tissue damage, chronicity caused as a result of inflammation induced functional impairment.

In our country, the traditional system of medicine plays an important role in health care of rural people for all types of ailments. The healing power of traditional herbal medicines have been realized and documented since Rig-Veda and Atharba-Veda.

It is well known that traditional herbal medicine existed before the application of modern scientific method to health care and even today majority of the world population depends on herbal health care practices.

Cassia fistula Linn. (Cassia) family Caesalpiniiacae commonly known as Sonaru in Assamese and popularly called “Indian Laburnum” in English, has been extensively used for various ailments in ayurvedic system of medicine.

Traditionally different parts of the plant are used for different disease condition like roots are used in chest pain, blood dysentery, heart disease, retained secretions and biliousness, fruits in asthma, diabetes, as antipyretic, abortifacient, demulcent, to lessen inflammation and heat of the body, useful in chest complaints, pulp for constipation, colic, chlorosis and urinary retention.

Seeds are useful in jaundice, biliousness, skin disease. Juice of leaves is used for treating different skin diseases.

Many pharmacological properties of different parts of the plant have been proved like antitussive, leukotriene inhibitory, hepatoprotective, hypoglycaemic, antioxidant, laxative, wound healing, ‘anti-inflammatory activity of bark has been reported.

This study was undertaken to evaluate anti-inflammatory activity of Cassia fistula fruit pulp against acute inflammation.

Materials and Methods

The study was carried out in the department of pharmacology at Assam Medical College. Fruits of Cassia fistula were collected within Dibrugarh district of Assam. A taxonomist of Dibrugarh University identified and confirmed the fruit samples. Collected fruits of Cassia fistula were washed thoroughly with water. After peeling of the fruits, seeds were separated. The pulp was allowed to boil with distilled water for 30 mins. It was kept for 3 days by shaking in between. Then filtered and concentrated. The concentrated filtrate was dried in a desiccator and the extract thus obtained was kept for future use in the study.

All the animals used in the study were taken care of under ethical consideration with approval from the institutional ethical committee (Registration no.-634/02/a/CPCSEA), Assam Medical College.

Toxicity studies: Aqueous extract of Cassia fistula fruit pulp was subjected to acute oral toxicity (OECD Guidelines, 2001). Mortality in the acute oral toxicity test was not seen in the limit test up to dose 2000 mg/kg.

Experimental Design: 30 albino rats weighing 100-200gm of either sex were taken for the study. The animals were divided randomly into five groups of six animals per group. The rats were maintained on a standardized diet and water ad libitum. For experimental purpose, the animals were kept fasting overnight, but allowed free access to water. All drugs were administered orally with the help of a feeding tube.

<table>
<thead>
<tr>
<th>Table-1 Showing the experimental design for anti-inflammatory activity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group</strong></td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>A (Control)</td>
</tr>
<tr>
<td>B (Test 1)</td>
</tr>
<tr>
<td>C (Test 2)</td>
</tr>
<tr>
<td>D (Test 3)</td>
</tr>
<tr>
<td>E (Standard)</td>
</tr>
</tbody>
</table>

Material required are: Aqueous extract of Cassia fistula fruit pulp, aspirin, 1% suspension of carrageenan, normal saline.

Carrageenan induced paw oedema method in albino rats was applied for evaluating anti-inflammatory activity of aqueous extract of Cassia fistula fruit pulp on acute inflammation.

In all groups acute inflammation was produced by subplanter injection of 0.1 ml of freshly prepared 1% suspension of carrageenan in normal saline, in the left hind paw of the rats.

One hour before carrageenan injection the animals in control group, test groups and standard group received normal saline, test drug (AECFF) and standard drug (aspirin) respectively orally.

Paw volume up to the articulation was measured by plethysmometer, at 0’hr (just before carrageenan injection) and then at 1’hr, 2’hr and 3’hr after carrageenan injection.
The “volume of oedema” was recorded as the differences between the paw volume at 0 hr and increase in paw volume at each hour up to 3 hour. After each hour of carrageenan injection upto 3 hr, the percentage inhibition of the rat paw oedema was calculated.5

Percentage (% inhibition) = Control mean – Treated mean × 100
Control mean

Statistical Analysis
The data obtained were subjected to statistical analysis using one way ANOVA followed by Dunnett’s multiple comparison test. A probability level of \( p < 0.01 \) obtained and considered to be significant. The percentage of inhibition of paw oedema was calculated on 1st, 2nd and 3rd hours.

Results
The present study showed that both aqueous extract of Cassia fistula leaf pulp and standard drug aspirin possessed significant anti-inflammatory activity against acute inflammation induced by carrageenan. AECFF showed significant anti-inflammatory activity at all three selected doses at 1st hour, 2nd hour and 3rd hour and maximum percentage of inhibition of paw oedema was observed at 3rd hour after carrageenan injection. Standard drug aspirin also showed maximum percentage of inhibition of paw oedema at 3rd after carrageenan injection.

Table 2: Anti-inflammatory activity of the aqueous extract of Cassia fistula fruit pulp on carrageenan induced rat paw oedema

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean increase in paw volume (Mean ±SEM)</th>
<th>Percentage of inhibition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st hour</td>
<td>2nd hour</td>
</tr>
<tr>
<td>Group A (CONTROL)</td>
<td>0.28 ± 0.01</td>
<td>0.43 ± 0.01</td>
</tr>
<tr>
<td>Group B (TEST 1)</td>
<td>0.22 ± 0.05</td>
<td>0.30 ± 0.05</td>
</tr>
<tr>
<td>Group C (TEST 2)</td>
<td>0.20 ± 0.02</td>
<td>0.24 ± 0.02</td>
</tr>
<tr>
<td>Group D (TEST 3)</td>
<td>0.16 ± 0.05</td>
<td>0.20 ± 0.05</td>
</tr>
<tr>
<td>Group E (STANDARD)</td>
<td>0.17 ± 0.02</td>
<td>0.25 ± 0.02</td>
</tr>
</tbody>
</table>

Values are expressed as Mean ± SEM, n=6 rats in each group, \( p < 0.01 \) compared to control group.

Discussion
The present study showed that AECFF at different doses possessed significant (\( p < 0.01 \)) anti-inflammatory activity against acute inflammation induced by carrageenan. Paw oedema induced by carrageenan has two phases. In the first phase, mediators like histamine, serotonin and kinins are released. The second phase is mediated by prostaglandin like substances that are released in 2-3 hours.5

AECFF at the doses 50mg/kg, 100mg/kg and 200mg/kg showed significant percentage of inhibition of carrageenan induced paw oedema when compared to the control which was maximum at 3rd hour. The anti-inflammatory activity of AECFF may be due to the inhibition of release of some mediators of inflammation which are released by carrageenan injection in rat. After observing these results, further and detailed studies on this plant are required to confirm the true potential of this plant, for its anti-inflammatory activity, which would make it viable clinically and humas also have cost effectiveness.

Acknowledgment
We express our thanks to the faculty, technical and non-technical staff of the department of pharmacology, Assam Medical College, Assam for helping us in conducting this study.

References