EVALUATION OF ANTI-INFLAMMATORY ACTIVITY OF ETHANOLIC EXTRACT OF SALACIA FRUTICOSA

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ABSTRACT

Salacia fruticosa belongs to family Hippocrateaceae has been traditionally used as remedy against diabetes mellitus, gastritis and inflammation. No scientific studies have been carried-out so far, in order to reveal the anti-inflammatory activity of Salacia fruticosa. The present study was aimed to investigate the anti inflammatory activity of ethanolic extract of salacia fruticosa by using carrageenan induced paw edema in albino rats at the dose of 200mg/kg body weight. The standard and control used for this study were diclofenac sodium (10mg/kg) and normal saline (10ml/kg) respectively. The paw volumes of test, standard and control groups were measured at 60, 240,360 minutes of carrageenan treatment with the help of Digital Plethysmometer (Ugo basile, Italy). Mean increase in paw volume was measured and the percentage of inhibition was calculated. The extract showed significant anti-inflammatory activity as compared to standard.

KEYWORDS: Salacia fruticosa, anti-inflammatory, carrageenan, diclofenac sodium.

INTRODUCTION

Inflammation is the response of living tissues to injury. It involves a complex array of enzyme activation, mediator release and extravasations of fluid, cell migration, tissue breakdown and repair.\(^1\) Inflammation is a major condition associated with various diseases. It is a defensive response that is characterized by redness, pain, heat and swelling and loss of function in the injured area.\(^2\)
The primary goal for inflammation treatment is to free from pain, inflammation and to improve the function of the inflamed area.\textsuperscript{[3]} Non steroidal anti inflammatory drugs (NSAIDs) are usually indicated for the treatment of acute or chronic conditions where pain and inflammation are present.\textsuperscript{[4]} All the steroids and NSAIDs, despite their usefulness, cause undesired and serious side effects which in many cases are severe enough to pose the risk of ulcer perforation, upper gastrointestinal bleeding and death could limit their use in therapy.\textsuperscript{[5]} Therefore, new anti-inflammatory drugs which are lacking those side effects being searched all over the world as alternatives to NSAIDs and opiates.\textsuperscript{[6, 7]}

Medicinal plants have long been used worldwide in folk medicine as an alternative treatment of inflammatory processes of diverse origins.\textsuperscript{[8]} Medicinal plants consists of various phytochemicals like alkaloids, flavonoids, polyphenols, glycoside. These bioactive compounds from medicinal plants have shown many pharmacological activities. Screening of various bioactive compounds from plants has lead to the discovery of new medicinal drug which have efficient protection and treatment roles in against various diseases.\textsuperscript{[9]} Nowadays, much interest has arisen in the search of medicinal plants with anti-inflammatory activity which may lead to the discovery of new therapeutic agents without too many side effects.\textsuperscript{[10]} One of such plant is \textit{salacia fruticosa}. It is used as acrid, bitter, anti-inflammatory, liver tonic, and stomachic. It is useful in vitiates conditions of diabetes, hemorrhoids, skin diseases, amenorrhea, dysmenorrhea, wounds and ulcers.\textsuperscript{[11]} However, no scientific studies have been reported regarding the anti-inflammatory activity of \textit{Salacia fruticosa}. So, it was decided to carry out the anti-inflammatory activity of \textit{salacia fruticosa} to prove its traditional claim.

**MATERIALS AND METHODS**

**Plant Material**

The healthy and fresh aerial parts of \textit{Salacia fruticosa} were collected from Pathanamthitta District of Kerala and was identified and authenticated by Dr. V. Chelladurai (Research Officer–Botany, Tirunelveli, Tamilnadu). The voucher specimen of the plant was deposited in the Institute’s herbarium for further reference.

**PREPARATION OF EXTRACT**

The shade dried plant materials were pulverized into coarse powder for easy extraction and great penetration of solvents to dissolve the active constituents present inside the cell. The
powdered materials were extracted with ethanol by using soxhlet apparatus and the extracts were concentrated to dryness and stored in dessicator for further studies

**Animals Used**

Albino rats of both sexes weighing 180–220 g were used for this study. The animals were placed at random and allocated to treatment in polypropylene cages with paddy husk as bedding. All animals were allowed to free access to water and fed with standard commercial pellet rat chow (M/s. Hindustan Lever Ltd, Mumbai). All the experimental procedures and protocols used in this study were reviewed by the Institutional Animal Ethics Committee and were in accordance with the Institutional ethical guidelines. IAEC/KMCP/79/2012-2013.

**Evaluation of Anti Inflammatory Activity**

The animals were divided into 4 groups each having six animals. A freshly prepared suspension of carrageenan (1% w/v, 0.1 ml) was injected to the planter region of left hind paw of each rat. One group was kept as control and the animals of the other groups were pretreated with standard and ethanolic extract of *Salacia fruticosa*, 60 min before the carrageenan treatment. The paw volumes of the test compound, standard and control groups were measured at 60, 240, 360 minutes of carrageenan treatment with the help of Digital Plethysmometer (Ugobasile, Italy). Mean increase in paw volume was measured and the percentage of inhibition was calculated.$^{[12, 13]}$

\[
\% \text{ Anti-inflammatory activity} = \left( \frac{V_c - V_t}{V_c} \right) \times 100
\]

Where, \( V_t \)-mean increase in paw volume in rats treated with test compound, \( V_c \)-mean increase in paw volume in control group of rats.

**RESULT AND DISCUSSION**

The anti-inflammatory activity of ethanolic extract of *Salacia fruticosa* at a dose of 200 mg/kg was evaluated using carrageenan-induced paw edema method. The inflammation was readily produced in the form of edema with the help of irritant such as carrageenan. Carrageenan is a sulphated polysaccharide obtained from seaweed (Rhodophyceae) and when injected cause the release of prostaglandins by the way it produces inflammation and edema.$^{[14]}$

The paw volumes of test, standard and control groups were measured at 60, 240,360 minutes of carrageenan treatment with the help of Digital Plethysmometer (Ugo basile, Italy). Mean
increase in paw volume was measured and the percentage of inhibition was calculated. The results were presented in Table 1.

### Table 1: Anti-Inflammatory Activity of Ethanolic Extract of Salacia Fruticosa.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose (mg/kg)</th>
<th>Paw volume (ml) as measured by mercury displacement at 6 hour</th>
<th>Percentage inhibition of paw edema</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I Normal saline</td>
<td>10ml/kg orally</td>
<td>6.55±0.90</td>
<td>______</td>
</tr>
<tr>
<td>Group II Std</td>
<td>10mg/kg I.P. Diclofenac sodium</td>
<td>1.98±0.45</td>
<td>69.77%*a</td>
</tr>
<tr>
<td>Group III (EESF)</td>
<td>200mg/kg. Orally.</td>
<td>2.80±0.60</td>
<td>57.25%*a</td>
</tr>
</tbody>
</table>

**EESF** - Ethanolic extract of *Salacia fruticosa*

*Data are expressed as Mean ± S.E.M.*

*Data were analyzed by one way ANOVA followed by Newman’s keul’s multiple range tests, to determine the significance of the difference between the control group and rats treated with the test compound.

*a Values were significantly different from normal control at P< 0.01.

The result revealed that the ethanolic extract of *Salacia fruticosa* at the dose of 200mg/Kg have possessed good anti-inflammatory activity. It is showing that at the dose of 200mg/Kg the extract significantly presents the inhibition of oedema with highest percentage of 57.25.

Inflammation induced by carrageenan, which is a classical model in acute inflammation to evaluate anti-inflammatory activities of Non Steroidal Anti-inflammatory Drugs.\(^{[15]}\) The development of oedema in the paw of the rat after the injection of carrageenan is a biphasic response. The initial phase is due to the release of histamine and serotonin and the maintenance of the oedema during the plateau is caused by kinine like substances.\(^{[16]}\)

The second phase of oedema is due to the release of prostaglandins, protease and Lysozyme, that is mediated by bradykinin, leucotrienes, polymorphonuclear cells and produced by tissue macrophages.\(^{[17]}\) It is well known that, NSAID such as Diclofenac exert anti-inflammatory activity by the inhibition of cyclooxygenase and suppresses production of chemical substances (prostaglandin, histamine and serotonin) which are involved to increase vasodilatation and vascular permeability.\(^{[18]}\) This extract significantly inhibited carrageenan-induced paw oedema same as that of Diclofenac sodium. This result indicates that the inhibitory effect of
the ethanolic extract of Salacia fruticosa on carrageenan induced inflammation may be due to the inhibition of cyclo-oxygenase leading to inhibition of prostaglandin synthesis.

CONCLUSION
The ethanolic extract of aerial parts of Salacia fruticosa has possessed significant anti-inflammatory activity. This experimental findings support the traditional use of this plant as anti-inflammatory agents. However, further investigation are required to isolate the active constituents of the plant responsible for anti-inflammatory activity.

REFERENCES