ANTI-INFLAMMATORY ACTIVITY OF METHANOLIC EXTRACT OF \textit{BRASSICA JUNCEA} SEED ON CARRAGEENAN INDUCED PAW EDEMA IN RATS

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ABSTRACT: Inflammation is a primary physiological defence mechanism that helps body to protect itself from infection, toxic chemicals or other noxious stimuli. The methanolic seeds extract of \textit{Brassica juncea} was evaluated for its anti-inflammatory activity, in-vivo methods. Anti-inflammatory drugs with low toxicity and higher therapeutic values. It is defensive mechanism of the body to remove the injurious stimuli as well as initiate the healing process for the tissue. \textit{Brassica juncea} has been used since ancient times and it is popularly known as mustard. The aim of present study was to evaluate the anti inflammatory activity of methanolic extract of \textit{Brassica juncea} against carrageenan induced paw edema test at different doses (500 and 1000 mg/kg body weight) of the methanolic extract. At the dose of 1000 mg/kg body weight, the extract showed a significant anti-inflammatory activity in the carrageenan induced oedema test models in rats showing 65.98% reduction in the paw volume comparable (P<0.05) to that produced by the standard drug indomethacin 81.96% at 5 hours respectively. The results of this study explicate justification of the use of this plant in the treatment of inflammatory disease conditions.

INTRODUCTION: Inflammation is a part of biological response of vascular tissue to harmful stimuli such as pathogens, damaged cell or irritant. In Asian countries the seed of \textit{brassica juncea}, which are used as traditional folk medicine for the treatment of curing tumors, galctagogue, arthritis footache and rheumatism. The purified natural compounds from plants can serve as a new route for synthesis of new generation anti inflammatory drugs with low toxicity and higher therapeutic values.

Chemicals and Drugs: Indomethacin, Carrageenan and Methanol.

Plant Material: The seeds of \textit{Brassica Juncea} (Family: Brassicaceae) was collected from Bannala, distt-Khargone(Madhya Pradesh), identified and authenticated by Dr. C. S. Dulkar (Taxonomist), Government Post Graduate College Khargone,
Madhya Pradesh and animal experimental protocols were in compliance with Ethics Committee on Research in Animals as well as internationally accepted principles for the use and care of experimental animals in Pinnacle Biomedical Research institute(PBRI) Bhopal (Reg. No. 1283/C/09/CPCSEA). The seeds of *Brassica Juncea* were coarsely powdered and extraction was carried out in soxhlet apparatus with help of methanol as a solvent at 60°C -70°C. Dried methanolic extract was stored at 4°C. The methanolic extract was completely solubilized in 1% w/v Cellulose Methyl cellulose solution for use in *in-vivo* experiments.

**Anti-Inflammatory Activity:**

**Carrageenan induced Rat Paw Edema Model:** The rats were divided into four groups containing six rats (one control, one standard & two test groups) and acute inflammation was induced according to edema assay. The extract was evaluated for the anti-inflammatory activity. Acute inflammation was produced by sub-plantar injection of 0.1 ml of 1% Carrageenan in normal saline in the right hind paw of the rats, 1h after the administration of the drug/extract. The paw diameter was measured by using digital calipers at the intervals of 1, 3 and 5 hours after the Carrageenan injection. Indomethacin (10 mg/kg, orally.) was used as standard drug.

**Control group:** 1% Carrageenan solution (5 ml /kg b.w)  
**Standard group:** Carrageenan + Indomethacin (10 mg/kg b.w)

**TABLE 1: ANTI-INFLAMMATORY ACTIVITY OF BRASSICA JUNCEA SEED METHANOIC EXTRACT ON CARRAGEENAN INDUCED PAW EDEMA IN RATS**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Treatment</th>
<th>Dose</th>
<th>Paw Diameter (mm)</th>
<th>% Inhibition at 5 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 Hour</td>
<td>3 Hour</td>
<td>5 Hour</td>
</tr>
<tr>
<td>1</td>
<td>Vehicle</td>
<td>1.62±0.111</td>
<td>1.85±0.071</td>
<td>2.44±0.131</td>
</tr>
<tr>
<td>2</td>
<td>Indomethacin</td>
<td>0.77±0.098*</td>
<td>0.67±0.100</td>
<td>0.44±0.086</td>
</tr>
<tr>
<td>3</td>
<td>Methanolic extract</td>
<td>1.35±0.139*</td>
<td>1.19±0.132</td>
<td>0.95±0.091</td>
</tr>
<tr>
<td>4</td>
<td>Methanolic extract</td>
<td>1.18±0.141*</td>
<td>1.02±0.117</td>
<td>0.83±0.131</td>
</tr>
</tbody>
</table>

Results are mean ± S.E.M. (n=6) *P<0.05

**DISCUSSION:** The present study establishes the anti-inflammatory activity of the methanolic extract of *Brassica Juncea* in the experimental model. Carrageenan induced rat paw edema is a suitable experimental animal model for evaluating the anti-inflammatory effect of natural products and this is believed to be triphasic, the first phase (1 Hour after carrageenan challenge) involves the release of serotonin and histamine from mast cells, the second phase (3 Hour) is provided by kinins and the third phase (5 Hour) is mediated by prostaglandins, the cyclooxygenase products and lipoxygenase products. The present activity may be due to presence of alkaloids. The possible mechanism of action of alkaloids might suppress the antigen and

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**Test group 1:** Carrageenan + Methanolic extract (500 mg/kg b.w)  
**Test group 2:** Carrageenan + Methanolic extract (1000 mg/kg b.w)

The anti-inflammatory activity was calculated as percentage inhibition of Carrageenan induced paw edema using the following formula:

\[
\text{Percent inhibition} = \left(1 - \frac{\text{dt}}{\text{dc}}\right) \times 100
\]

Where dt = paw diameter in treated  
  dc = paw diameter in control

**Statistical Analysis:** Results of the study were expressed as mean ± S.E.M. followed by Dunnett’s t-test were used to determine significant differences between groups. P-values less than 0.05 were considered as indicative of significance.

**RESULTS:** The present result of anti-inflammatory activity was used as the irritant to induce paw edema due to induction of inflammation. Methanolic extract was administered at 500 mg/kg and 1000 mg/kg and it was found to be significantly effective. Paw thickness was found to significantly less (P<0.05) in animals treated with extract at both doses. With progress in time on 1st, 3rd and 5th hour, test samples significantly decreased the thickness with percent inhibition of 61.06 and 65.98 on 5th hour at 500 mg/kg and 1000 mg/kg respectively. The detailed results are shown in Table 1.
mitogen induced lymphocyte proliferation, natural killer cell cytotoxicity, histamine release by mast cells, interleukin-1 secretion by human monocytes 13, 14.

CONCLUSION: *Brassica Juncea* showed anti inflammatory properties, similar to those observed for non-steroidal anti inflammatory drugs, such as Indomethacin. It is also suggested that the mechanism of action of *Brassica Juncea* might be associated with the inhibition of histamine, serotonin and prostaglandins synthesis. However further studies are needed to isolate and characterize anti inflammatory chemical constituents present in Methanolic extracts of the plant.

ACKNOWLEDGEMENT: The authors are thankful to principal Dr. Dolly Malohtra and Head of Department Chemistry, Govt. Geetanjali Girls P.G. College, Barkattulla University, Bhopal, Madhya Pradesh for providing necessary facilities to carry out this research work.

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