ANTI-INFLAMMATORY ACTIVITY OF METHANOLIC EXTRACT OF BRASSICA JUNCEA SEED ON CARRAGEEAN INDUCED PAW EDEMA IN RATS

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ABSTRACT: Inflammation is a primary physiological defense mechanism that helps the body to protect itself from infection, toxic chemicals, or other noxious stimuli. The methanolic seeds extract of Brassica juncea was evaluated for its anti-inflammatory activity, in-vivo methods. Anti-inflammatory drugs with low toxicity and higher therapeutic values. It is a defensive mechanism of the body to remove the injurious stimuli as well as initiate the healing process for the tissue. Brassica juncea has been used since ancient times, and it is popularly known as mustard. Present study aimed to evaluate the anti-inflammatory activity of methanolic extract of 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 significant anti-inflammatory activity in the carrageenan-induced edema 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 the biological response of vascular tissue to harmful stimuli such as pathogens, damaged cell, or irritant1. In Asian countries, the seed of brassica juncea, which are used as a traditional folk medicine for the treatment of curing tumors, galactagogue, arthritis footache and rheumatism2, 3. The purified natural compounds from plants can serve as a new route for the synthesis of new generation anti-inflammatory drugs with low toxicity and higher therapeutic values4. It is a defensive mechanism of the body to remove the injurious stimuli as well as initiate the healing process for the tissue. It is believed that current drugs available such as opioids and NSAIDs drugs are not useful to in cases of inflammatory disorders because of their side effect economy and potency5, 6. The present study was aimed to evaluate the anti-inflammatory potency of methanolic extract of Brassica Juncea against carrageenan-induced paw edema in rats7.

Chemicals and Drugs: Indomethacin, Carrageenan, and Methanol.

Plant Material: The seeds of Brassica Juncea (Family: Brassicaceae) was collected from Bammala, 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 the help of methanol as a solvent at 60 °C - 70 °C. The dried methanolic extract was stored at 4 °C. The methanolic extract was completely solubilized in 1% w/v Cellulose Methylcellulose 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 subplantar injection of 0.1 ml of 1% Carrageenan in normal saline in the right hind paw of the rats, 1 h after the administration of the drug/extract. The paw diameter was measured by using digital calipers at the intervals of 1, 3, and 5 h 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).

**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.

\[
\text{Percent inhibition} = 1 - \frac{dt}{dc} 	imes 100
\]

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. The 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 1\(^{st}\), 3\(^{rd}\) and 5\(^{th}\) h, test samples significantly decreased the thickness with percent inhibition of 61.06 and 65.98 on the 5\(^{th}\) hour at 500 mg/kg and 1000 mg/kg respectively. The detailed results are shown in Table 1.

**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. It is believed to be triphasic, the first phase (1 h after carrageenan challenge) involves the release of serotonin and histamine from mast cells, the second phase (3 h) is provided by kinins and the third phase (5 h) is mediated by prostaglandins, the cyclooxygenase products, and lipoxygenase products. The present activity may be due to the presence of alkaloids. The possible mechanism of action of alkaloids might suppress...
the antigen and 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.

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CONFLICT OF INTEREST: Nil

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