



Received on 10 March 2014; received in revised form, 23 April 2014; accepted, 07 June 2014; published 01 September 2014

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

Yogendra Singh Chouhan^{*}, H.C. Kataria and C.S. Goswami

Department of Chemistry, Government Geetanjali Girls PG College, Barkattulla University, Bhopal - 462038, Madhya Pradesh, India.

Keywords:

Brassica juncea,
Anti-inflammatory, Methanolic
extract, Carrageenan

Correspondence to Author:

Yogendra Singh Chouhan

Research Scholar,
Department of Chemistry,
Government Geetanjali Girls PG
College, Barkattulla University,
Bhopal - 462038, Madhya Pradesh,
India.

E-mail: yogendra_scs@yahoo.co.in

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 rheumatism^{2, 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 potency^{5, 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 Bamnala, Khargone (Madhya Pradesh), identified and authenticated by Dr. C. S. Dulkar (Taxonomist), Government Post Graduate College

<p>QUICK RESPONSE CODE</p> 	<p>DOI: 10.13040/IJPSR.0975-8232.5(9).3849-51</p> <hr/> <p>This article can be accessed online on www.ijpsr.com</p> <hr/> <p>DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.5(9).3849-51</p>
---	--

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.

$$\text{Percent inhibition} = 1 - dt \times 100 / dc$$

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

Statistical Analysis: Results of the study were expressed as mean \pm 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 1st, 3rd and 5th h, test samples significantly decreased the thickness with percent inhibition of 61.06 and 65.98 on the 5th hour at 500 mg/kg and 1000 mg/kg respectively. The detailed results are shown in **Table 1**.

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

S. no.	Treatment	Dose	Paw Diameter (mm)			
			1 h	3 h	5 h	% Inhibition at 5 h
1	Vehicle	5 ml/kg	1.62 \pm 0.111	1.85 \pm 0.071	2.44 \pm 0.131	-
2	Indomethacin	10ml/kg	0.77 \pm 0.098*	0.67 \pm 0.100*	0.44 \pm 0.086*	81.96
3	Methanolic extract	500ml/kg	1.35 \pm 0.139*	1.19 \pm 0.132*	0.95 \pm 0.091*	61.06
4	Methanolic extract	1000ml/kg	1.18 \pm 0.141*	1.02 \pm 0.117*	0.83 \pm 0.131*	65.98

Results are mean \pm 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 8, 9 and this 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^{10, 11}. The present activity may be due to the presence of alkaloids¹². 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.

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

CONFLICT OF INTEREST: Nil

REFERENCES:

1. Singh A, Malhotra S and Subban R: Anti-inflammatory and analgesic agents from Indian Medicinal Plants, *International Jou of Integrative Biology* 2008; 3: 57-72.
2. Kamali HH and Amir MY: Antibacterial activity and phytochemical screening of ethanolic extracts obtained from selected sudanese medicinal plants. *Curr Res J of Bio Sci* 2010; 2(2): 143-46.
3. Kumar MA: Ethnomedicinal plants as anti-inflammatory and analgesic agents, *Ethnomedicine: A Source of Complementary Therapeutics* 2010; 267-93.

4. Ahmadiani A: *J Ethanopharmacol* 1998; 61: 229-35.
5. Gambhire MN, Wankhede SS and Juvekar AR: *Journal of Young Pharmacists* 2009; 1(3): 220-24.
6. Kanchan, Chauhan PK, Jaryal M, Kumari K and Singh M: Phytochemical and in vitro antioxidant potential of aqueous leaf extracts of *Brassica juncea* and *Coriandrum sativum*. *International Journal of Pharmaceutical Sciences and Research* 2012; 3(8): 2862-65.
7. Sireeratawong S, Vannasiri S, Sritiwong S, Itharat S, Jaijoy K: Anti-inflammatory, anti-nociceptive and antipyretic effects of the ethanol extract from root of *Piper sarmentosum* Roxb. *J Med Assoc Thai* 2010; 93(7): S1-S6.
8. Winter CA, Risley EA and Nuss GW: Carrageenan-induced edema in hind paws of the rat as an assay for anti-inflammatory drugs, *Proc soc Exp Biol Med* 1962; 52: 544-52.
9. Hemayet H, Ismet AJ, Sariful IH, Jamil AS, Shubhra KD and Arpona H: Anti-inflammatory and antioxidant activities of ethanolic leaf extract of *Brownlowia tersa* (L.) Kosterm. *Oriental Pharmacy and Experimental Medicine* 2013; 13: 181-89.
10. A *Brassica juncea* chitinase with two-chitin binding domains show anti-microbial properties against phytopathogens and Gram negative bacteria. *Plant Signaling & Behavior* 2008; 3(12): 1103-05.
11. Antibacterial qualities and phytochemical screening of the oils of *Curcubita pepo* and *Brassica juncea*. *Journal of Medicinal Plants Research* 2009; 3(5): 429-32.
12. Mahesh S, Patil MB and Kumar R: Evaluation of anti-inflammatory activity of ethanolic extract of *Borassus flabellifer* L. Male flowers in experimental animals, *Journal of Medicinal Plants Research* 2009; 3(2): 49-54.
13. Kaushik A, Kaushik JJ, Das A, Gemal S and Gaim D: Preliminary studies on anti-inflammatory activities of *Diplazium esculentum* in experimental animal models. *International Journal of Pharmaceutical Sciences and Research* 2011; 2(5): 1251-53.
14. Hemayet H, Ismet AJ, Sariful IH, Jamil AS, Shubhra KD and Arpona H: Anti-inflammatory and antioxidant activities of ethanolic leaf extract of *Brownlowia tersa* (L.) Kosterm. *Oriental Pharmacy and Experimental Medicine* 2013; 13:181-89.

How to cite this article:

Chouhan YS, Kataria HC and Goswami CS: Anti-inflammatory activity of methanolic extract of *Brassica juncea* seed on carrageenan induced paw edema in rats. *Int J Pharm Sci & Res* 2014; 5(9): 3849-51. doi: 10.13040/IJPSR.0975-8232.5(9).3849-51.

All © 2013 are reserved by International Journal of Pharmaceutical Sciences and Research. This Journal licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.

This article can be downloaded to **ANDROID OS** based mobile. Scan QR Code using Code/Bar Scanner from your mobile. (Scanners are available on Google Playstore)