

Efficacy of Anti-inflammatory Potential of Hydroethanolic Fruit extract of *Ziziphus jujube*

Jyoti Pethari^{1*}, Rahul Saxena¹¹Ravishankar College of Pharmacy, Bhopal (M.P.), India

*Corresponding Author: Jyoti Pethari

Ravishankar College of Pharmacy, Bhopal (M.P.), India

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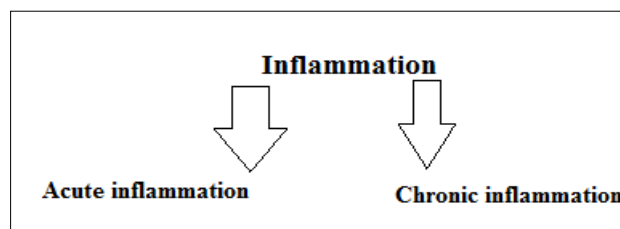
Abstract: Every third person in the world has an inflammatory condition, which can strike at any stage of life. Inflammation is a fairly prevalent disease. Inflammation can be treated in a variety of ways. There are many medications on the market that are connected to the allopathic medical system. Herbal medications have a higher market value since they have fewer adverse effects and are less harmful. Due to their excellent nutritional and health benefits, the fruits of the *Ziziphus jujube* tree, also known as jujube, red dates, or Chinese dates, are consumed as food both fresh and dried around the world. The pharmacological properties of jujube fruits, including their anticancer, anti-inflammatory, antiobesity, immunostimulating, antioxidant, hepatoprotective, gastrointestinal protective, and suppression of foam cell formation in macrophages, have been shed some light by recent phytochemical investigations. The goal of the current study was to evaluate *Ziziphus jujube* hydroethanolic extract's anti-inflammatory potential.

Keywords: Hydroethanolic extract of *Ziziphus jujube* [HEZJ], Anti-inflammatory & Carrageenan suspension.

INTRODUCTION

The goal of Ayurveda is to treat illness and stop it from starting. Throughout ayurvedic literatures, numerous food and medication items were suggested as ways to accomplish this goal. Due to their widespread availability, herbal materials and their preparations were often employed for dietary and therapeutic purposes [1]. NSAIDs, also known as non-steroidal anti-inflammatory medicines, are among the most often prescribed medications for the treatment of pain and inflammation. By inhibiting the Cyclooxygenase (COX) enzyme and subsequently the formation of PGs, NSAIDs generate their mode of action (Prostaglandins) [2]. Infectious germs like bacteria, viruses, or fungi typically cause inflammation when they attack the body, live in specific tissues, or circulate in the circulation. Furthermore, events like tissue damage, cell death, malignancy, ischemia, and degeneration may result in inflammation [3].

Type of Inflammation



The oxidative stress may cause inflammatory cascades that damage the cellular components. The humoral and cellular mechanisms of inflammation are numerous and complex. They involve gene regulatory factors such as the nuclear factor-kappa B (NF- κ B) and signaling substances synthesized by immune system cells such as cytokines and prostaglandins [4]. The plant *Ziziphus jujube* is also known as Ber, jujube. It taxonomically belongs to the family

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Rhamnaceae. The *Ziziphus jujube* Pers. mostly found almost all parts of areas [5]. The leaves used for hypoglycemic effects, reduction of sweetness judgements, as diuretic, emollient, expectorant, to promote hair growth, anticancer, sedative, blood purifier and in treatment of diarrhoea [6].



Ziziphus jujuba plant and Fruits

The present study was conducted to assess the antinociceptive and anti-inflammatory properties of hydroethanolic extract of *Ziziphus jujube*.

EXPERIMENTAL WORKS

Preliminary work (Selection of Plant)

The plant was selected on the basis of their antioxidant and antimicrobial activities and wide medicinal uses in the traditional literature. The ease of availability of plant is also taken in to consideration during selection.

Gathering sufficient information from vivid articles and journals it was concluded that there is scope to explore some more pharmacological activities in the plant *Ziziphus jujube* hence it was selected for further studies.

Collection of plant

Ziziphus jujube fruits was collected from various places from Bhel area Govindpura Bhopal (M.P.) during the month of Aug 2018.

Authentication of plant material

The plant has been identified and authentication by, Head of the Department Botany at the Safia college of science, Bhopal (M.P.). The plant part specimens were submitted as herbarium. (Voucher Specimen No: 105/ Safia College Bhopal, dated 07 Aug 2018)

Drying, size reduction and storage of plant material

The plants parts were dried under shade. It was pulverized to coarse powder with the help of mixer grinder. The coarse powder was passed through sieve No. 20 to maintain uniformity and packed into airtight container and stored in cool and dry place. This material was used for the further study.

Preparation of all selected plant part extract

Extraction of *Ziziphus jujube* fruits was done by Soxhlet extraction method.

Acute oral toxicity studies (OECD 423)

Acute oral toxicity study was evaluated as per OECD guidelines (423) on Wistar albino rats. Animals were provided by Sapience Bio Analytical Research Lab, Bhopal (M.P.) and experiment was done in the lab. Before experimentation rats were fasted overnight with water ad libitum. Three animals were selected which receives dose of 2000mg/kg. All three animals were received dose of 2000 mg/kg body weight of poly herbal pormulation (hydro-alcoholic extract of all plants extract+ 1% aqueous CMC) by gavage using oral cannula (limit test). Animals were observed individually for any toxicity sign of gross changes like convulsion, tremor, circling, depression, and mortality after dosing for 24 hours, with special attention given during the first 4 hours, and thereafter, 24 hours, Administered dose was found tolerable (as no death found) [7].

Anti-inflammatory Potential: Carrageenan -Induced paw edema in rats

The animals were divided into four groups of six animals each. Acute inflammation was produced by subplantar injection of 0.1 ml of 1% suspension of carrageenan with 1% CMC in normal saline, in the right hind paw of the rats, one hour after oral administration of the drugs (test, standard). The paw volume was measured with the help of vernier calliper at ‘0’ and ‘3’ hours after the carrageenan injection. The difference between the two readings was taken as the volume of edema and the percentage anti-inflammatory activity was calculated. Diclofenac Na (50 mg/kg, p.o.) suspended in 2% gum acacia was used as the standard drug [8].

Table 1: Ziziphus jujube extract used in the estimation of anti-inflammatory activity by carrageenan induced model

Group	Treatment	Dose
GP-1 Test control-1	Ziziphus jujube extract	350 mg/kg p.o.
GP-2 Test control-2	Ziziphus jujube extract	250 mg/kg p.o.
GP-3 Standard control	Diclofenac Na	50 mg/kg
GP-4 Normal control	Normal saline	0.9%

RESULT AND DISCUSSION

Ziziphus jujuba Mill. (Z. jujuba) is a traditional herb with a long history of use for nutrition and the treatment of a broad spectrum of diseases. Rising evidence shows the health benefits of Z. jujuba, including anticancer, anti-inflammation, anti-obesity, antioxidant, and hepato- and gastrointestinal protective properties, which are due to its bioactive compounds. In both phase I and Phase II procedures, none of the animal mortal or any signs of behavioral changes or show any toxicity upon the single administration of HAZJ (2000 mg/kg p.o.). Thus, 250mg/kg & 350mg/kg doses was selected for the present study (Table 2). The HEZJ at 350 mg/kg p.o. showed significant inhibition of 32.60% as compared with standard (Diclofenac) having %inhibition of 47.12%. The result was tabulated in the table 3. The results of this study indicate that the HEZJ significantly reduced carrageenan induced paw oedema in rats. Therefore, the mechanism of action may be by inhibition of histamine, serotonin or prostaglandin synthesis.

Table 2: Results of Acute oral toxicity study of HAZJ

Group name	Animal mark	Dose mg/kg	Body weight (gm)			Observation	Mortality (If any)
			1 day	7 days	14 days		
Control	H	Normal saline (0.91%)	153	148	146	No sign of toxicity & all animals Survived	No mortality occurs
	B		155	150	152		
	T		138	135	132		
Test	HT	2000 mg/kg of poly-Herbal formulation (Once dosing at start of acute oral toxicity study)	205	208	202		
	BT		190	185	180		
	NM		175	165	168		

Table-3: Carrageenan Induced paw edema activity

Changes in paw volume (mm)								
Group Name	Treatment	Dose	0 hr	1 hr	2 hr	3 hr	4 hr	Inhibition % of paw edema (mm)
Disease control	Carrageenan	0.1 ml (1% suspension of carrageenan + 2% gum acacia in normal saline)	1.76 ± 0.12	3.13± 0.7	3.25±0.6	3.54±0.8	3.65±0.09	-
Standard	Diclofenac	50 mg/kg, p.o.	1.86 ± 0.3	3.06± 03	3.05±0.1	2.54±0.8	1.93±0.02	47.12 %
Test-1	Ziziphus jujube fruits extract	250 mg /kg, p.o.	1.8 ± 0.06	3.05 ± 0.05	3.20 ± 0.02	3.17 ± 0.12	2.77 ± 0.02	24.10%
Test-2	Ziziphus jujube fruits Extract	350 mg/kg p.o.	1.85 ± 0.01	3.21 ± 0.02	3.05 ± 0.01	2.91 ± 0.15	2.46 ± 0.01	32.60%

p < 0.05-significant compared to carrageenan treated group. Values are mean ±SEM, of six animals in each group. Following repeated measures ANOVA parametric methods, using Dunnett Test.

CONCLUSION

In various traditional medicinal system a number of natural products are used to relieve the symptoms of pain. These studies have identified that compounds such as alkaloids, phenols, tannins, fixed oils and flavonoids are responsible for analgesic activity. The observed analgesic activity of this plant could have resulted from the combined activity of these compounds present in the extracts. Traditional system of medicines causes side effects like teratogenicity, discoloration of skin, hypersensitive reactions. Natural products are found to be most promising and viable alternative for conventional medicines in the treatment of pain and analgesia.

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