



## Anti-inflammatory activity of *Ziziphus jujuba* Lam leaves extract in rats

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### Abstract

**Objective:** To evaluate the anti-inflammatory activity of the alcoholic extract of *Ziziphus jujuba* Lam leaves in albino rats. **Materials and methods:** *Ziziphus jujuba* leaves were extracted with 90 % ethanol and the extract was screened for anti-inflammatory activity at the doses of 200, 400 and 600 mg/kg using acute carrageenan induced paw oedema in albino rats. Diclofenac sodium (100 mg/kg, p.o.) was used as standard reference drug. **Results:** The % inhibition of paw edema at 3 h after carrageenan administration produced by *Ziziphus jujuba* leaves extract at the dose of 200, 400 and 600 mg/kg was 44.5%, 62.2% and 81.8% respectively when compared to control. The paw oedema attenuating effect of *Ziziphus jujuba* leaves extract at the dose of 600 mg/kg was comparable with that produced by diclofenac sodium (88.6%). **Conclusion:** The present study indicates that *Ziziphus jujuba* leaves extract possess significant anti-inflammatory activity against carrageenan-induced rat paw edema.

**Key words:** anti-inflammatory, carrageenan, inflammation, *Ziziphus jujuba*.

### 1. Introduction

*Ziziphus jujuba* Lam (Rhamnaceae) is a small subdeciduous tree commonly known as Indian jujube. The leaves of *Ziziphus jujuba* are traditionally used to cure diarrhoea, syphilitic ulcers, asthma, stomatitis and gum bleeding and also used as poultice and astringent [1]. The young leaves are pounded with those of *Ficus glomerulata* and applied to scorpion stings in konkan [2]. The leaves of *Z. jujuba* are reported to possess hypoglycaemic [3], antiulcer [4], immunomodulatory [5] and Permeability

enhancement activity [6]. However, its anti-inflammatory activity is not scientifically documented. Hence, the present study was undertaken to evaluate anti-inflammatory activity of *Ziziphus jujuba* leaves extract (ZJE) using carrageenan-induced paw edema in albino rats.

### 2. Materials and methods

#### 2.1 Plant material

The fresh leaves of *Ziziphus jujuba* were collected from the damp fields near Belgaum

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and were positively identified by Prof. S.B.Sasalatti, Head, Department of Botany, K.L.E.S's R.L.Science Institute, Belgaum, Karnataka.

## 2.2 Preparation of extract

The leaves were shade dried at room temperature, powdered and subjected to percolation using 70 % ethanol. The dark green filtrate obtained was evaporated at 50°C under reduced pressure to get a viscous mass. For animal testing, the extract was prepared fresh as an aqueous suspension using 1 % CMC solution. The crude extract obtained was subjected to preliminary phytochemical investigation [7], which showed the presence of alkaloids, steroids, flavonoids, proteins, triterpenoids and polysaccharides.

## 2.3 Animals

Inbred Wistar rats (150-200g) of either sex were used. Animals were housed under standard conditions of temperature (23±1°C), 12 h light/dark cycle and fed with standard chow diet and water *ad libitum*. Before performing the experiment, ethical clearance was obtained from Institutional Animal Ethics Committee.

## 2.4 Carrageenan-induced rat paw edema

Rats were randomly divided into five groups of six animals each. First group served as control (received 1% CMC solution, 5 ml/kg, p.o.), second group served as standard (received diclofenac sodium, 100 mg/kg, p.o.) and remaining groups received ZJE at the dose of 200, 400 and 600 mg/kg, p.o. respectively.

After 1 h, 0.1 ml of 1 % w/v suspension of carrageenan was injected into the sub plantar region of the left hind paw to all group of animals [8]. The paw volume was measured plethysmographically at 0,1,2,3 h after carrageenan administration. The % inhibition of edema at 3 h was calculated.

## 2.5 Statistical analysis

The values are expressed in mean ± SEM (n=6). The results were analysed by using Student's *t* - test and the level of significance was set at  $p < 0.05$ .

## 3. Results

The results of anti-inflammatory effect of ZJE against carrageenan-induced inflammation are showed in Table 1. Paw volume was

Table 1  
Effect of ZJE on carrageenan induced rat paw edema

Treatment (n=6)	Dose (mg/kg)	Mean increase in paw volume (ml) at			% Inhibition of edema after 3 h
		1h	2h	3h	
1% CMC	(5 ml/kg)	1.56 ± 0.52	2.61 ± 0.42	4.92 ± 0.22	-
ZJE	(200 mg/kg)	1.15 ± 0.42 <sup>a</sup>	1.93 ± 0.44 <sup>a</sup>	2.76 ± 0.15 <sup>a</sup>	44.5%
ZJE	(400 mg/kg)	0.98 ± 0.14 <sup>b</sup>	1.46 ± 0.32 <sup>b</sup>	1.84 ± 0.25 <sup>b</sup>	62.2%
ZJE	(600 mg/kg)	0.66 ± 0.22 <sup>c</sup>	0.78 ± 0.26 <sup>c</sup>	0.88 ± 0.12 <sup>c</sup>	81.8%
Diclofenac Sodium	(100 mg/kg)	0.43 ± 0.14 <sup>c</sup>	0.52 ± 0.24 <sup>c</sup>	0.57 ± 0.18 <sup>c</sup>	88.6%

Values are mean ± SEM (n=6)

<sup>a</sup> $p < 0.05$ , <sup>b</sup> $p < 0.01$  and <sup>c</sup> $p < 0.001$  as compared to control (1% CMC) group.

significantly reduced in all the three doses of ZJE treated groups as compared to control group of rats treated with 1% CMC. But the 600 mg/kg dose of ZJE treated rats showed maximum anti-inflammatory effect and was comparable to that produced by 100 mg/kg of diclofenac sodium. The % inhibition of edema at 3h after carrageenan challenge produced by ZJE at 200, 400 and 600 mg doses and diclofenac sodium (100 mg/kg) was 44.5%, 62.2%, 81.8% and 88.6% respectively.

#### 4. Discussion

Carrageenan-induced paw edema is the most widely used method to screen anti-inflammatory agents. The development of carrageenan-induced edema is biphasic; the initial phase is attributed to release of histamine, 5-hydroxytryptamine and kinins in the first hour after injection of carrageenan and the most

pronounced second phase is related to release of prostaglandin like substances in 2-3 h [9].

The alcoholic extract of *Ziziphus jujuba* showed dose dependent significant anti-inflammatory activity at 1, 2 and 3 h against carrageenan injection, suggesting that it predominantly inhibits the release of inflammatory mediators from phlogenic stimuli. However, further studies are necessary to identify and isolate the active constituents responsible for its anti-inflammatory activity and also there is a need to elucidate its mechanism/s of anti-inflammatory action.

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