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Analgesic and anti-inflammatory activities of *Zizyphus rugosa* root barks

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ABSTRACT

The root barks of Zizyphus rugosa were extracted with water, chloroform, ethyl acetate and methanol to determine their anti-inflammatory and analgesic activities, Aqueous extract (50, 100 mg/kg) given intraperitoneally (i.p.) showed a significant and dose-dependent anti-inflammatory and analgesic activity.

Key words: *Zizyphus rugosa*. Root bark extract, Antiinflammatory activity analgesic activity.

INTRODUCTION

Most of the drugs from plants which have become important in modern medicine had a folklore origin and are traditional in systems of medicine. Species of fruits trees in the Zizyphus spp. Are examples of multipurpose plants with great potential for ethnomedicinal use all over the world, *Zizyplus rugosa* (Rhamnaceae), a large shrub sometimes arborusment [1]. The fruit is described as demulcent and enters into the treatment of throat and broncho-pulmonic irritations. Thus, the dried powder leaves and fruits are applied topically in the treatment of boils [2].

A phytochemical study reported that cyclopeptide akaloids [6-8] and six flavones glycosides [9] and one saponine were [10] isolated from root barks of Z, rugosa. In continuation of this study, we have extracted this plant wieth different solvents and a preliminary screening showed that aqueous and methanolic extracts were rich in flavonoids. In this work, we are reported the anti-inflammatory and analgesic activites of different extracts of root barks.

EXPERIMENTAL SECTION

Plant Material

Z. rugosa root barks, collected from district Sonebhadra (U.P.) and were identified by the department of Botany, B.H.U.

Preparation of extracts

A first specimen of root barks dried and powdered was submitted to a decoction for 15 to 20 min. the aqueous extract (AE), filtered and evaporated gave a dry residue (yield: 14.38%, w/w/) A second specimen, dried and pulverized, was Soxhlet-extracted with chloroform (CE), EtoAc (EAE) and MeOH (ME) giving the corresponding extracts (yields : 0.03%. 1.29 and 25.27% respectively).

Animals

Wistar rats weighing 180-200 g and Swiss albino mice weighing 18-22 g were taken. They were housed in polypropylene cases and were kept in a room maintained under controlled condition. All animals were fed with a standard diet ad libitum and hand free access to drinking water.

Acute toxicity study

Eighty mice were divided into eight groups of ten animals each. One group served as a control and received 0.9% NaCl alone (10ml/kg) given intraperitoneally (i.p.), while the remaining seven groups were treated with increasing doses of the aqueous extract; 50,100,200,400,600,800 and 1000 mg/kg (i.p.) respectively. The mortality rate with a 24 h period was determined and the LD50 was estimated according to the method described by Miller and Tainter [11]. According to the results of acute toxicity test, the doses of 50, 100 and 200 mg/kg were chosen for experiments.

Anti-inflammatory activity

The anti-inflammatory activity of aqueous extract of Z.rugosa on carrageenan-induced paw edema was determined according to Winter et.al. [12]. The animals were divided into three groups consisting of six rats each. The control groups received the root barks extract at the dose of 50-200 mg/kg, i.p. Fifteen min after intraperitoneal administration of different substances, 0.05 ml of 1% of carrageenan suspension was injected to all animals in the left hind paw.

The paw volume, up to the tibiotarsal articulation was measured using a plethysmometer (model 7150, Ugo Basile, Italy). The measures were determined at 0 hy (before carragenan and 0.5, 1,2,3,4,6,24 h later.

Analgesic activity

The analgesic activity was performed according to the method of Koster et al [13]. Swiss mice were selected on day prior to each test and were divided into three groups of six mice each. One group served as the control and was treated with 10ml/kg of saline i.p. The second group was given ASA (200 mg/kg) by the same route, as a reference drug. The remaining group was treated with the root barks extract at a dose of 50 200 mg/kg i.p. All animals received 10ml/kg (i.p.) of 1% acetic acid 15 min after treatment. The number of abdominal writhing was recorded during 30 min.

Statistical analysis

All data were represented as mean ±S.EM and as percentage. Results were statistically evaluated using Student's t-test. P<0.05 was considered significant.

RESULT

Intraperitoneal administration of aqueous extract of root barks at 50 mg/kg did not produce any mortality, while the dose 100 mg/kg caused 100% mortality in mice. The LD50 was estimated at 400 mg/kg.

The intraperitoneal administration of the aqueous extract of Z rugosa root barks (50, 100 and 200 mg//kg) reduced significantly the paw edema induced by carrageenan by 37.81%, 69.18% and 72.90% respectively three hours after the injection of a noxious agent. After intraperitoneal administration of methanolic extract, significant activity was observed at the dose of 200 mg/kg, at the third hour after carrageenan injection, with 67.57% reduction in paw volume. On the contrary, Only a small and not significant activity was seen at the sixth h after the injection of ethyl acetate and chloroform extracts. Standard drugs (ASA and piroxicam) decreased paw edema by 70.27 and 54.54%, respectively at the third hour (Table.1).

Table.1 Effects of intraperitoneal administration of the Z rugosa root barksextractson the carrageenan-induced rat hind paw edema

Treatment	Dose (mg/kg)	Paw edema volume mean (102 ml) ±SEM						
		0.5 h	1 h	2 h	3 h	4 h	6 h	24 h
Saline		21.11±1.77	38.11±4.91	65.33±6.17	91.66±9.33	100.33±10.64	108.11±12.07	73.88±6.85
AE	50	15.66±3.17	22.33±2.60	39.00±8.18	57.00±7.21	60.33±9.20	68.66±9.82	48.00±20.00
AE	100	12.75±1.03	15.75±1.43**	22.5±4.92*	28.25±7.66*	39.50±10.94*	43.50±9.34*	34.50±4.94*
AE	200	10.16±1.01**	12.83±0.79**	18.66±2.64**	24.83±3.40**	28.33±3.20**	30.83±3.51**	26.66±4.58**
ASA	300	12.25±0.62*	14.50±1.55**	17.25±1.31**	27.25±4.26**	31.00±3.18*	42.5±3.77	46.25±6.86
Piroxicam	5	18.00 ^{ns} ±1.86	24.33±2.34*	31.33±4.46*	41.66±5.73*	54.16±4.16*	62.00±3.27*	55.66±3.63*
Saline		17.10±1.98	24.65±3.47	59.60±7.82	84.80±10.5	102.20±10.47	103.90±15.03	58.90±9.58
ME	200	14.75±2.95 ^{ns}	16.75±1.60 ^{ns}	18.00±3.10*	27.50±5.31*	35.25±7.19**	45.25±9.31	35.50±4.78 ^{ns}
EAE	200	17.75±1.75^{ns}	25.50±1.84 ^{ns}	48.00±8.53 ^{ns}	67.00±8.49ns	69.00±6.94 ^{ns}	67.50±4.71 ^{ns}	43.75±7.22 ^{ns}
Saline		24.00±3.05	38.00±8.08	67.66±21.98	113.00±29.77	122.66±9.83	125.00±10.53	98.66±4.40
CE	200	25.50±1.50^{ns}	45.45±12.50 ^{ns}	73.50±30.50 ^{ns}	97.00±20.00 ^{ns}	105±15.00 ^{ns}	110.50±0.50 ^{ns}	76.50±6.50

*Values are expressed as mean± SEM. 8P<0.01, **P<0.0 01. Ns: not significant (N=6).*

Table.2 Effect of the Z rugosa root barks extracts on acetic acid-induceed writhing in mice

Treatment response	Dose (mg/kg)	Number of writhes (per 30 min)	Inhibition of writhing (%)
Saline	-	100.84±5.64	-
AE	50	62.70±7.32*	37.82
AE	100	35.91±2.21**	64.39
AE	200	28.66±3.19**	71.57
ASA	200	36.95±6.27**	63.35
Saline	-	108.50±12.84	-
ME	200	40.80±6.72*	62.39
EAE	200	86.88±6.99ns	19.92
Saline	-	106.90±9.30	-
CE	200	54.43±7.58	49.08

*Value are expressed as mean SEM. *IPI<0.001, ns: not significant (N=6)*

On acetic acid-induced writhing in mice, a dose-dependent effect was observed after intraperitoneal administration of the aqueous extract (50,100 and 200 mg/kg) with a significant decrease of writhing by 37.82, 64.39 and 71.57 (Table 2). Also the methanolic extract (19.92%) was ineffective ASA the reference drug inhibited 63.35% of the number of writhing elicited by acetic acid (Table-2).

DISCUSSION

Carrageenan has been widely used as a noxious agent able to induce experimental inflammation for the screening of compounds possessing anti-inflammatory activity [14]. This phlogistic agent, when injected locally into the rat paw, produced a serve inflammatory reaction, which was discernible within 30 min [15]. The development of edema induced by carrageenan corresponds to the events in the acute phase of inflammation, mediated by histamine, bradykinin and prostaglandins produced under an effect of cyclooxygensase [16]. Two classical NSAIDs, aspirin (ASA) and piroxicam are cyclooxygenase-inhimitors [17] theymarkedly reduced the paw edema.

The aqueous and methanolic extract of Z rugosa root barks showed significant aniinflammatory effect in the acute phase of the inflammation process as compared with NSAIDs products. In the acetic acid-induced writhing response in mice, aqueous extract of root barks (50,100 and 200 mg/kg) was shown to possess a significant analgesic effect compared to the control group. In addition, we have investigated the effect of methanolic ethyl acetate and chloroformic extracts of Z, rugosa root barks. The results showed that methanolic extract had significant analgesic activity superior to chloroform and ethyl acetate extracts.

We consider that the presence of flavonoids in the aqueous extract and alcoholic extract could be responsible for the anti-inflammatory and analgesic effects. The intraperitoneal LD_{50} obtained with aqueous extract of Z root barks suggests a reasonable safety margin with regard to acute toxicity.

We may conclude that these results support the traditional use of this plant in some inflammatory and painful conditions and confirm the presence of active chemical compounds related to these activities.

REFERENCES

[1] Boukef K. Paris: Agence de Cooperation Technique, p.61 (**1986**)
[2] Hooker, J.D. “The Flora of British India” Vol I. p. 632 (**1875**)
[3] Kirtikar, K.R. and Basu, B.D., “Indian Medicinal Plants”, Vol. I.P. 592 (**1975**).
[4] Watanabe, I., *Japan J. Pharm* 23, 563 (**1973**)
[5] Le-Floc’h El Publications Scientifiques Tunisiennes; p. 150 (**1983**)
[6] tschesche, R; Shah, A.H. Pandey, V.B. Singh, J.P. et. Al. *Pharmazie,* 36,511 (**1981**)
[7] Tripathi, Y.C. Maurya, S.K. Singh V.P. and Pandey, V.B. *Phytochemistry*, 28(5), 1563 (**1986**).
[8] Pandey, V.B., Tripathi, Y.C. Devi, S; Singh J.P. and Shah, A.H; *Phytochemistry,* 27(6), 1915 (**1988**)
[9] Tripathi, Y.C.; Devi, S, Pandey, V.B and Shah, A.H, *Fitoterapia,* 59(2) 158 (**1988**).

[10] Pandey V.B. and Tripathi Y.C., *Fitoterapia*, 64(4), 34(**1993**)
[11] Miller LC. Tainter ML. *Proc Soc Exp Biol Med*; 57, 26(**1944**)
[12] Winter CA. Rislley EA. Nuss GW *Proc Soc Exp Biol Med*. **1962**; 111;554
[13] Koster R. Anderson M. DeBeer Ej. *Fed Proc*; 18; 418(**1959**
[14] John H, Nodine MD. Chicago; Year Book Medical Publishers InC 199; 492
[15] Roch-Arveiller M, Giroud JP. *Biol*; 27;615(**1979**)
[16] Vinegar R, Truax JF, Selph JL *Fed proc*; 35;2447 (**1976**)
[17] Frolich JC TIPS 18;30 (**1997**)