Antiinflammatory Activity of Bark of *Bridelia retusa* Spreng

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In the present study, aqueous and alcohol extracts of the bark of *Bridelia retusa* (Linn.) Spreng. (Euphorbiaceae) were investigated for acute antiinflammatory activity in carrageenan-induced rat paw oedema. Both the extracts exhibited significant dose-dependent inhibition of rat paw oedema in dose of 50 mg/kg, orally and 100 mg/kg, orally, when compared to control group. The activity was compared with a standard drug, diclofenac sodium (15 mg/kg, orally).

Inflammatory diseases including different types of rheumatic diseases are very common throughout the world. The greatest disadvantage in the presently available potent synthetic drugs lies in their side effects, toxicity and reappearance of symptoms after discontinuation. Hence, search for new antiinflammatory agents that retain therapeutic efficacy and yet are devoid of adverse effects are justified. There is much hope of finding active antirheumatic compounds from indigenous plants as these are still used in therapeutics despite the progress in conventional chemistry and pharmacology in producing effective drugs[1].

Bridelia retusa (Linn.) Spreng. is a deciduous shrub or a tree up to 18 m in height, found throughout India up to an altitude of 1000 m except in the very dry regions[2]. The bark is traditionally used for rheumatism[3], arthritis and antifertility[4]. A literature review revealed no scientific investigation regarding antiinflammatory activity of the bark of plant. In the present investigation, an attempt was made to screen the bark for antiinflammatory activity based on its folklore use.

The bark was collected from Majgaon (Western Ghat area) of Belgaum district during October 2001 and authenticated at the Department of Botany, R. L. Science Institute, Belgaum. The shade dried bark was pulverized to a coarse powder of # 40. A portion of the powder was subjected to cold maceration with distilled water for 7 d and the remaining powder was exhaustively extracted with 95% alcohol in a Soxhlet extractor. Aqueous extract was dried at room temperature while alcohol extract was concentrated on a rotary vacuum flash evaporator at 50° and finally to a dry residue. Both the extracts were kept in a desiccator till experimentation. The test and standard doses were prepared in 1 ml vehicle (distilled water) to get desired concentration of each.

Antiinflammatory activity was assessed using carrageenan-induced rat paw oedema method[5]. The ethical clearance was obtained before the experiment from the Institutional Animal Ethics Committee (Registration number 221/CPCSEA). Male Wistar rats, weighing between 100-150 g, were procured from the animal house of Jawaharlal Nehru Medical College, Belgaum. Rats were kept in the polypropylene cages and fed on a standard laboratory diet with water *ad libitum*. The animals were exposed to alternate cycle of 12 h of darkness and light each. Rats were divided into six groups of 6 animals each. Group 1 (control) received 1ml distilled water, group 2 received 15 mg/kg, p.o. diclofenac sodium, groups 3 and 4 received two doses of alcohol extract, 50 mg/kg and 100 mg/kg, p.o., respectively and groups 5 and 6 received two doses of aqueous extract 50 mg/kg and 100 mg/kg, p.o., respectively. After 1 h, the rats were challenged with subcutaneous injection of 0.1 ml of 1% w/v solution of carrageenan into the planter side of the left hind paw. The paw was marked with ink at the level of lateral malleolus and immersed in mercury up to this mark. The paw volume was measured plethysmographically immediately after injection (0 h) and followed by every hour till the 6th h after injection of carrageenan to each group. The dif-

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TABLE 1: ANTIINFLAMMATORY ACTIVITY OF EXTRACTS OF *BRIDELIA RETUSA* BARK.

Group and treatment	Increase in paw volume (ml) at different intervals (h)					
	1 h	2 h	3 h	4 h	5 h	6 h
1. Control	0.33±0.04	0.46±0.01	0.82±0.01	1.00±0.04	1.05± 0.01	1.00± 0.02
2. Diclofenac sodium (15 mg/kg)	0.16±0.02 (51.5)*	0.28±0.02 (39.1)*	0.53±0.02 (35.4)*	0.57±0.01 (43.0)*	0.42±0.01 (60.0)*	0.25±0.01 (75.0)*
3. Alcohol extract (50 mg/kg)	0.32±0.02 (3.0)	0.40±0.02 (13.0)	0.58±0.02 (29.3)*	0.66±0.01 (34.0)*	0.65±0.03 (38.1)*	0.61±0.02 (39.0)*
4. Alcohol extract (100 mg/kg)	0.29±0.02 (12.1)	0.36±0.07 (21.7)	0.29±0.06 (64.6)*	0.21±0.05 (79. 0)*	0.22±0.04 (79.0)*	0.03±0.06 (97.0)*
5. Aqueous extract (50 mg/kg)	0.27±0.01 (18.1)	0.37±0.02 (19.6)	0.55±0.03 (39.9)*	0.64±0.02 (36.0)*	0.65±0.02 (38.1)*	0.62±0.02 (38.0)*
6. Aqueous extract (100 mg/kg)	0.15±0.07 (54.5)	0.24±0.07 (47.8)	0.16±0.07 (80.5)*	0.27±0.06 (73.0)*	0.17±0.05 (83.4)*	0.05±0.08 (95.0)*

*Indicates significant anti-inflammatory activity at P<0.001 compared to control. All values are mean±SE of sample size of 6. All treatments are given orally. Values in parenthesis are percent inhibition of increase in paw volume.

ference between the initial and subsequent reading gave the actual oedema volume.

Percent inhibition of inflammation was calculated using the formula, % inhibition = 100 (1-Vt/Vc), where 'Vc' represents oedema volume in control and 'Vt', oedema volume in group treated with test extracts. Statistical analysis was performed using student's t-test. Level of significance was set at P<0.001. The results obtained as mean increase in paw volume (ml) and % inhibition is represented in Table 1.

Carrageenan-induced inflammation is a biphasic phenomenon[6]. The first phase of oedema is attributed to release of histamine and 5-hydroxytryptamine. Plateau phase is maintained by kinin like substances and second accelerating phase of swelling is attributed to prostaglandin like substances[7]. The knowledge of these mediators involved in different phases is important for interpreting mode of drug action.

The results obtained indicate that both alcohol and aqueous extracts, in the doses administered, were found to have statistically insignificant anti-inflammatory activity at 1st and 2nd h (P>0.001). However, both alcohol and aqueous extracts showed dose-dependent antiinflammatory activity at 3rd, 4th, 5th and 6th h (P<0.001) while the standard drug, diclofenac sodium showed significant activity from 1st to 6th h (P<0.001). These results indicate significant antiinflammatory activity in carrageenan-induced rat paw oedema. The antiinflammatory activity possessed by the bark extracts is being reported for the first time. However, detailed phytochemical investigation of the bark is necessary to understand the constituents responsible for the antiinflammatory activity.

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REFERENCES

1. Chawla, A.S., Handa, S.S., Sharma, A.K. and Kaith, B.S., **J. Sci. Ind. Res.**, 1987, 46, 214.
2. Anonymous, In; The Wealth of India: A Dictionary of Indian Raw Materials and Industrial Products, 2nd Edn., Vol. II B, Publications and Information Directorate, C.S.I.R , New Delhi, 1988, 295.
3. Kirtikar, K. R., Basu, B.D., In; Indian Medicinal Plants, 2nd Edn., Vol. III, International Book Distributors, Dehradun , 1999, 2213.
4. Jain, S.K., In; Dictionary of Indian Folk Medicine and Ethnobotany, Deep Publications, New Delhi, 1991, 38.
5. Winter, C.A., Risley, E.A. and Nuss, G.W., **Proc. Soc. Exp. Biol. Med.**, 1962, 111, 544.
6. Vinegar, R., Schreiber, W. and Hugo R. J., **J. Pharmacol. Exp. Ther.**, 1969, 166, 96.
7. Rosa, M. D., Giroud, J.P. and Willoughby D. A., **J. Pathol.**, 1971, 104, 15.