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ANTI-INFLAMMATORY AND ANTIPYRETIC ACTIVITIES OF *HEMIDESMUS INDICUS* ROOT EXTRACT

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Abstract

The methanolic extracts of *Hemidesmus indicus* (Asclepiadaceae) root (100, 200 and 400 mg/kg orally) were tested in carrageenan-induced rat paw oedema and brewer's yeast-induced pyrexia in rats to assess their anti-inflammatory and antipyretic activities respectively. The paw volumes and pyrexia in rats were reduced significantly ($P < 0.05$) compared to that of control. These results indicate that the extracts possess anti-inflammatory and antipyretic properties.

Key words: *Hemidesmus Indicus*, Anti-inflammatory and Antipyretic activity.

Introduction

Hemidesmus indicus (L) R.Br. (family: Asclepiadaceae) is a twining shrub which has been used as folk medicine and as ingredient in Ayurvedic and Unani preparations against diseases of blood, inflammation, diarrhoea, respiratory disorders, skin diseases, syphilis, fever, bronchitis, asthma, eye diseases, epileptic fits in children, kidney and urinary disorders, loss of appetite, burning sensation and rheumatism etc. (Vaidya and Kulkarni, 1991; Nadkarni, 1989). It has also been used in combination with other drugs for snake bite (Kirthikar and Basu, 1935; Mors, 1991). Recently, this plant was used to treat viper venom (haemotoxic)-induced lethality (Alam et al., 1996) and against hypercholesterolaemia in hyperlipidaemic rats (Bopanna et al., 1997).

The present study is a scientific approach to reestablish the traditional uses of the plant *Hemidesmus indicus* and evaluate its anti-inflammatory and antipyretic activities.

Material and Methods

Plant material

Hemidesmus indicus roots (authenticated at Regional Research Institute, Bangalore, India by Dr. Yoganasimhan) were collected from Madikeri, Coorg District, Karnataka, India. The specimen

(PESCP/51) preserved in our laboratory for future reference. The roots were dried, powdered and passed through 40-mesh sieve and stored in an airtight container for further use.

Preparation of the extract

The powdered root material was extracted using 90% methanol as a solvent in a soxhlet extraction apparatus. The solvent was completely removed by using rotary flash evaporator to get semisolid mass [10.2 % w/w]. This methanol extract was stored in a desiccator and weighed quantity was dissolved in distilled water.

Animals

Albino rats (Wistar strain) of either sex weighing 180-200 g were used. The animals were maintained under suitable nutritional and environmental conditions throughout the experiment. All the pharmacological experimental protocols were approved by the Institutional animal ethics committee (Sanction No: CPCSEA / IAEC / 2004 / 346 dated 27.12.2004).

Acute toxicity study

Acute oral toxicity study was performed as per OECD-423 guidelines (acute toxic class method). The test was performed in rats divided into different groups of 6 each. After an over night fast, the test drug was administered orally in graded doses [100-500 mg/kg]. They were observed continuously for the first 2 h for toxic symptoms and up to 24 h for mortality (Litchfield et al., 1949)

Anti-inflammatory activity

Acute inflammation was produced by injecting 0.1 ml of (1%) carrageenan into plantar surface of rat hind paw (Winter et al., 1962). The test extract (100, 200 and 400 mg/kg orally), and phenylbutazone (100 mg/kg orally) as reference agent were administered 60 min before carrageenan injection. The paw volume was measured at 0, 1, 2, 3 and 4 h, using a thread to determine the diameter of oedema formation size. The difference in diameter between the left and right hind paws was taken as a measure of oedema.

Antipyretic activity

Rats were given 20 ml/kg (20%) suspension of brewer's yeast subcutaneously. Initial rectal temperature was recorded (Smith and Hamburger 1935). After 18 h animals that showed an increase of 0.3–0.5⁰C in rectal temperature were selected. The test extract (100, 200 and 400 mg/kg orally) was administered to three groups. Control group received 0.3 ml normal saline. Paracetamol (100 mg/kg orally) was used as reference drug. Rectal temperature was determined by thermal probe Ellab themistor thermometer 1, 2, 3 and 4 h, after test extract/reference drug administration.

Statistical analysis

The results and data obtained in this study were evaluated using the one-way analysis of variance (ANOVA) test between two mean groups; control and test groups, followed by Student's *t*-test. Significant levels were at $P < 0.05$

Table 1: Anti-inflammatory activity of methanolic extract of *H. indicus* root and phenylbutazone (100 mg/kg) on carrageenan-induced rat paw oedema in the right hind-limb paw of rats

Treatment	Dose (mg/kg)	Time (h)					Average oedema Formation
		0	1	2	3	4	
Control (Carrageenan treated)	-	0.43 ± 0.11	0.73 ± 0.01	0.86 ± 0.21	0.93 ± 0.10	0.74 ± 0.11	
Methanolic Extract of <i>H.indicus</i>	100	0.30 ± 0.12	0.33 ± 0.13*	0.24 ± 0.10*	0.16 ± 0.16*	0.26 ± 0.13*	
	200	0.33 ± 0.09	0.36 ± 0.10*	0.29 ± 0.13*	0.22 ± 0.08*	0.30 ± 0.10*	
	400	0.27 ± 0.03	0.23 ± 0.01*	0.20 ± 0.19*	0.17 ± 0.06*	0.22 ± 0.10*	
Phenylbutazone	100	0.21 ± 0.01	0.22 ± 0.06*	0.22 ± 0.01*	0.18 ± 0.09*	0.21 ± 0.04*	

Values are mean ± S.E.M. (n = 6), *P < 0.05 of the difference between the left and the right hind paws

Table 2: Effect of methanolic extract of *H. indicus* root on normal body temperature

Treatment	Dose (mg/kg)	Rectal temperature (°C) before and after treatment				
		0 h	1 h	2 h	3 h	4 h
Control (Saline)	5 ml/kg	37.6 ± 0.2	37.3 ± 0.1	37.3 ± 0.1	37.4 ± 0.3	37.0 ± 0.1
Methanolic Extract of <i>H.indicus</i>	100	37.4 ± 0.3	36.9 ± 0.1*	36.5 ± 0.1*	36.6 ± 0.2*	36.2 ± 0.1*
	200	37.3 ± 0.2	36.4 ± 0.1*	36.3 ± 0.1*	36.3 ± 0.1*	36.2 ± 0.1*
	400	37.2 ± 0.1	36.2 ± 0.1*	36.1 ± 0.1*	36.2 ± 0.1*	36.0 ± 0.1*

Values are mean ± S.E.M. (n = 6), *P < 0.05 compared with control values

Table 3: Antipyretic activity of methanolic extract of *H. indicus* root and paracetamol (100 mg/kg) on brewer's yeast-induced pyrexia in rats

Treatment	Dose (mg/kg)	Rectal temperature (⁰ C) before and after treatment					
		Before treatment		After treatment			
		0 h	18 h	1 h	2 h	3 h	4 h
Control (Saline)	5 ml/kg	37.6 ± 0.2	39.3 ± 0.1	39.1 ± 0.1	39.1 ± 0.2	39.1 ± 0.02	39.1 ± 0.01
Methanolic	100	37.4 ± 0.3	39.6 ± 0.1	38.5 ± 0.3	38.5 ± 0.2*	38.3 ± 0.1*	38.0 ± 0.2*
Extract of	200	37.6 ± 0.2	39.6 ± 0.1	38.1 ± 0.2*	38.1 ± 0.1*	38.0 ± 0.1*	37.9 ± 0.3*
<i>H.indicus</i>	400	37.7 ± 0.1	39.6 ± 0.1	38.0 ± 0.1*	38.0 ± 0.1*	37.9 ± 0.1*	37.8 ± 0.2*
Paracetamol	100	37.8 ± 0.2	39.5 ± 0.1	38.2 ± 0.3*	38.2 ± 0.2*	38.0 ± 0.4*	37.8 ± 0.3*

Values are mean ± S.E.M. (n = 6), *P < 0.05

Results and Discussion

Acute toxicity study

The methanolic extract of *Hemidesmus indicus* did not cause any mortality up to 500 mg/kg and was considered not toxic.

Anti-inflammatory activity

The results of the anti-inflammatory effect of the methanolic extract of *Hemidesmus indicus* on carrageenan-induced oedema in rat's right hind paws are presented in Table 1. There was a gradual increase in oedema paw volume of rats in the control (carrageenan treated). However, in the test groups, the extract showed a significant reduction in the oedema paw volume. As indicated in Table 1, a dose-related inhibition of hind paws oedema between 2 and 4 h was observed. Phenylbutazone as reference drug (100 mg/kg orally) produced a significant inhibitory effect comparable to tested extract.

Antipyretic activity

Effect of *H. Indicus* methanolic extract on normal body temperature in rats is presented in Table 2. It was found that the extract at a dose of 100 mg/kg caused significant lowering of body temperature at 4 h following its administration. This effect was maximal at doses of 200 and 400 mg/kg in dose dependent manner and it caused significant lowering of body temperature up to 4 h after its administration. The subcutaneous injection of yeast suspension markedly elevated the rectal temperature after 18 h of administration. Treatment with *H. indicus* extract at a dose of 100, 200 and 400 mg/kg decreased the rectal temperature of the rats in dose dependent manner (Table 3).

The antipyretic effect started as early as 1 h and the effect was maintained for 4 h, after its administration. Both the standard drug paracetamol 100 mg/kg and tested *H. indicus* extract significantly reduced the yeast-elevated rectal temperature compared to control group.

Conclusion

Based on the results of the present study it can be concluded that the methanolic extract of *Hemidesmus indicus* has potential dose-dependent anti-inflammatory and antipyretic activity. The activity is in dose dependent manner. Hence our present study gives a solid scientific approach to the traditional uses of the plant *Hemidesmus indicus*.

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