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Anti-inflammatory and Antipyretic Activity of *Decalepis hamiltonii* Root Extract

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Abstract

Decalepis hamiltonii Wight & Arn. (Asclepiadaceae) is widely used in the traditional system of medicine for many ailments. We examined the effectiveness of the methanol extract of roots of *Decalepis hamiltonii* at 250 and 500 mg/kg doses orally in the carrageenan-induced rat paw edema and cotton pellet–induced chronic inflammatory models. The extract showed significant dose-dependent anti-inflammatory activities in both models. The extract exhibited significant antipyretic activity at 250 and 500 mg/kg, p.o., in brewer's yeast–induced pyrexia.

Keywords: Anti-inflammatory, antipyretic activity, *Decalepis hamiltonii*.

Introduction

Decalepis hamiltonii Wight & Arn. (Asclepiadaceae) is a monogeneric climbing shrub that has been used as folk medicine and as an ingredient in Ayurvedic and Unani preparations against diseases of blood, diarrhea, respiratory disorders, skin diseases, syphilis, bronchitis, asthma, eye diseases, epileptic fits in children, kidney and urinary disorders, loss of appetite, burning sensation, rheumatism, and so forth etc. (George et al., 1998). Even though *Decalepis hamiltonii* was reported to be useful in many ailments, scientific evaluation of the plant was reported only for antimicrobial activity (Thangadurai et al., 2004); there are no reports regarding its anti-inflammatory and antipyretic activity. Hence, in the current study, the anti-inflammatory and antipyretic activity of the methanol extract of *Decalepis hamiltonii* roots was studied using different animal models. This study is a scientific approach to validate the traditional uses of the plant *Decalepis hamiltonii*.

Materials and Methods

Plant material

Dried roots of *Decalepis hamiltonii* were purchased from Hill Green Enterprises (Bangalore, India). Further taxonomic identification was conducted by Dr. Yoganarasimhan, Senior Scientist, Regional Research Institute (Bangalore, India). A voucher was deposited in the herbarium of our laboratory (no. PESCP/55). The powdered material weighing 1 kg was extracted by Soxhlet using 90% methanol. The solvent was completely removed by using a rotary flash evaporator to get a semisolid mass (102% w/w).

Animals

Albino mice and albino rats (Wistar strain) of either sex weighing 20–25 and 180–200 g, respectively, were used for the study. They were housed in polypropylene cages with standard pellet chow and water *ad libitum*. Animals were divided into four groups of six each.

Acute toxicity study

The test extract was soluble in water; hence, it was dissolved in water. The extract was administered orally to different groups of mice in doses ranging from 1000 to 2000 mg/kg for the LD_{50} study using the method of Miller and Tainter (Ghosh, 1971). There was no lethality in any of the groups after 7 days of treatment.

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Anti-inflammatory activity

Carrageenan-induced rat paw edema

Acute inflammation was produced by injecting 0.1 ml of (1%) carrageenan (in a normal saline solution) into plantar surface of rat hind paw (Turner, 1965). The test extract (250 and 500 mg/kg, orally), diclofenac sodium (13.5 mg/kg, orally) as reference agent were administered 60 min before carrageenan injection. The paw edema volume was recorded using a plethysmometer (Basile, Italy) at different time intervals (Winter et al., 1962).

Cotton pellet–induced granuloma in rats

Two sterilized cotton pellets, each weighing 10 mg, were implanted subcutaneously into axilla, in an anaesthetized rat (Turner, 1965). After treatment with a test extract at 250 and 500 mg/kg for 10 days, the rats were sacrificed. The pellets were dissected out and granuloma was dried at 60°C overnight to determine the dry weight. Results were expressed as mg/100 g.

Antipyretic activity

Rats were given 20 ml/kg (20%) suspension of brewer's yeast subcutaneously. Initial rectal temperature was recorded (Smith & Hambourger 1935). After 18 h, animals that showed an increase of 0.3–0.5°C in rectal temperature were selected. The test extract (250 and 500 mg/kg, orally) was administered to three groups. Control group received water. Paracetamol (100 mg/kg, orally) was used as reference drug. Rectal temperature was determined by thermal probe Ellab themistor thermometer (Durex, Illinois, USA) at different time intervals, 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. Effect of *Decalepis hamiltonii* extract on inflammatory models.

Treatment	Dose (mg/kg)	% Inhibition of paw edema inflammation at 3 h	Weight of granuloma (mg/100 g)
Control	0.00	0.00	63.8 ± 1.89
Methanol extract	250	62.63	$42.6 \pm 2.31^*$
Methanol extract	500	83.19	$37.2 \pm 3.13^*$
Diclofenac sodium	13.5	89.26	$30.5 \pm 1.90^*$

Values are mean ± SE, n = 6, $^*p < 0.05$ significant.

Results

The methanol extract of *Decalepis hamiltonii* roots was evaluated for anti-inflammatory and antipyretic activities. The test extract ingested up to 2000 mg/kg by the oral route failed to produce any lethality in mice. So we selected 250 and 500 mg/kg as the study doses of anti-inflammatory and antipyretic activities.

Anti-inflammatory activity

Carrageenan-induced rat paw edema

The test extract at doses of 250 and 500 mg/kg, as well as diclofenac sodium (13.5 mg/kg), showed significant inhibition of edema in dose-dependent manner 3 h after carrageenan-induced inflammation, when compared with control (Table 1).

Cotton pellet–induced granuloma in rats

There was a statistically significant reduction in the weight of granuloma in test extract–treated as well as diclofenac sodium–treated rats when compared with control (Table 1).

Antipyretic activity

The subcutaneous injection of yeast suspension markedly elevated the rectal temperature after 18 h of administration. Treatment with *Decalepis hamiltonii* extract at doses of 250 and 500 mg/kg decreased the rectal temperature of the rats in dose-dependent manner 4 h after pyrexia when compared with control (Table 2).

Table 2. Effect of *Decalepis hamiltonii* extract on yeast-induced pyrexia.

		Rectal temperature (°C) before and after treatment					
Treatment	Dose (mg/kg)	0 h	18 h	1 h	2 h	3 h	4 h
Control	0.00	37.6 ± 0.2	39.3 ± 0.1	39.1 ± 0.1	39.1 ± 0.2	39.1 ± 0.02	39.1 ± 0.01
Methanol extract	250	37.6 ± 0.2	39.6 ± 0.1	$38.1 \pm 0.2^*$	$38.1 \pm 0.1^*$	$38.0 \pm 0.1^*$	$37.9 \pm 0.3^*$
	500	37.7 ± 0.1	39.6 ± 0.1	$38.0 \pm 0.1^*$	$38.0 \pm 0.1^*$	$37.9 \pm 0.1^*$	$37.8 \pm 0.2^*$
Paracetamol	100	37.8 ± 0.2	39.5 ± 0.1	$38.2 \pm 0.3^*$	$38.2 \pm 0.2^*$	$38.0 \pm 0.4^*$	$37.8 \pm 0.3^*$

Values are mean ± SEM, n = 6, $^*p < 0.05$.

Discussion

The methanol extract of *Decalepis hamiltonii* did not show any toxicity at the various dose levels tested in albino mice. Therefore, 250 and 500 mg/kg were selected as doses for the study of anti-inflammatory activity and antipyretic activity. With the carrageenan-induced rat paw edema method, the extract of *Decalepis hamiltonii* showed significant anti-inflammatory and antipyretic activities at the tested doses.

Based on the results of the current study, it can be concluded that methanol extract of *Decalepis hamiltonii* has potential anti-inflammatory and antipyretic activity at doses of 250 and 500 mg/kg. The activity is in a dose-dependent manner.

This study confirms the anti-inflammatory and antipyretic activity of roots of *Decalepis hamiltonii*. Both activities were found to be comparable with reference drugs. Further studies need to be done to identify and separate the group of active constituents responsible for anti-inflammatory and antipyretic activity from methanol extract.

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