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Search for an Herbal Medicine: Anti-inflammatory Activity of Methanolic Extract of *Haldina cordifolia*

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ABSTRACT

Haldina cordifolia had been extensively used for its reported biological action in indigenous organization of medicine. The at hand investigation was carried out to discover the anti-inflammatory effect of methanolic extract of *Haldina cordifolia* in albino rats. The anti-inflammatory activity was evaluated by means of acute inflammatory model like carrageenan induced paw edema and chronic inflammatory model like cotton pellet induced granuloma respectively. The methanolic extract in different doses (100,200, and 400 mg/kg, p.o) exhibited dose dependent and significant anti-inflammatory activity in acute (carrageenan induced hind paw edema, $p < 0.05$) and chronic (cotton pellet granuloma formation, $p < 0.05$) model of inflammation.

INTRODUCTION

Herbal medicines are used cure several diseases from the range of parts of the plants. Natural drugs have been the foundation for therapeutic treatments from end to end of living beings, and such long-established drug is still commonly experienced today. Contemporary drug recognizes as a form of substitute medication, as observe of herbal drugs is not stringently based on confirmation gather by means of the disciplined method. A lot of the pharmaceuticals at present accessible to physicians have an extended the past of use as natural remedy, including cinchona, Rauwolfia, senna, and taxol. natural drugs for some feature of most important health care. The usefulness of therapeutic value and dietary requirements resultant from herbal source has an extensive use in now a day. Scientist from all the departments of science are establishing for phytochemicals and lead that may perhaps be residential for management of a mixture of disorders. Between the all active compounds at present secluded from the superior herbs and extensively used in contemporary drug these days, most of these demonstrate a constructive association connecting their up to date medicinal use and the conventional use of the natural drugs as of which they are originated. The evident from the a range of reports that *Haldina cordifolia*, family Rubiaceae has shown numerous impending pharmacological activities such as, antiulcer, anti-inflammatory, antinociceptive, hepatoprotective, antiamebic, anticancer, antidiabetic, antifertility, etc. from its different biological parts. Observance of the view of the exceeding mention therapeutic importance of the discussed plant I become fascinated to study the antibacterial activity of *Haldina cordifolia*. The antibacterial activity is still not reported for the plant. Therefore the present paper explores the antibacterial action of the Methanolic extract of *Haldina cordifolia* using various kinds of microorganisms. The study reveals that bulk of these microorganisms used shown impending antibacterial activity.

Introduction to the plant

Adina cordifolia Roxb. (Synonym: Haldina cordifolia) (Figure 1).



Figure 1. Adina cordifolia Roxb. (Synonym: Haldina cordifolia).

Family: Rubiaceae

Vernacular names:

English: Yellow teak ^[1]

Sanskrit: Haridru

Hindi: Haldu

Telugu: Pasupukadamba

Kannada: Hethega, Arisina tega

Morphology

A bulky deciduous tree with the stem often unevenly fluted and buttressed at the base and commonly attainment 6 m girth and 15-35 m in height. It is a blossoming plant in the family Rubiaceae.

Bark: Bark somewhat dark grey, chunky, irregular or blackish and in part pale pasty white or silvery white, wood yellow somewhat hard and even-grained.

Leaves: Leaves reverse 10-25 cm diameter, orbicular, curtly acuminate, bottom cordate, glabrous on top of pubescent under with 5-8 pairs of on the side nerves. Petiole 3.8-10 cm long, stout, teenage. Stipules 1.3-1.8 cm lengthy quadrilateral or obovate

Flowers: Flowers are inconsequential independently but are very attractive when they bloom jointly in balls with a perimeter of 2 to 3 cm. They are more often than not yellow in color frequently tinged with a shadow of pink.

Fruits: Fruits capsules split into two dehiscent cocci. Seeds many narrow small tailed above.

EXPERIMENTAL SECTION

Plant Material

The parts of the plant used in this erudition are the dehydrated leaf of plant *Haldina cordifolia* which is scatterbrained from the urban area of Nimapara of Puri district of Odisha. The material was well cleaned in fresh water and fully dehydrated in sunlight. The authentication was done in the Botanical department of Utkal University.

Preparation of Extract

The plant parts were made free from fatty materials by means of petroleum ether with hot percolation apparatus for 48 hrs. Following defatting with petroleum ether the resulted materials were additional extracted with methanol by hot percolating apparatus for 72 hrs. The isolate was then filtered and dried in vacuum. The resulting Methanolic extract was calculated for its yield and was found to 4.5 %.

Phytochemical Screening

The Haldina extract restricted alkaloids, flavonoids, fixed oils but no glycosides and tannins were detected. The alkaloids were established in both chloroform and methanol extract, whereas flavonoids segment was bring into being in methanol extract. Fixed oil is seen in petroleum ether extract.

Test Animals

Adult male albino rats (150-200 gms) were obtained from Department of Pharmacology, Faculty of Pharmacy Integral University, Lucknow and used throughout the study. They were housed in micro lon boxes in a controlled environment (temperature $27 \pm 3^\circ\text{C}$

and 12 hr dark/light cycle) with usual laboratory diet and water. All experimental procedures and protocol used in this study were reviewed and approved by institutional animal ethical committee, Faculty of Pharmacy Integral University, Lucknow

Anti-Inflammatory Activity

Carrageenan induced rat paw edema

The method of Winter et al (1962) was used to study acute inflammation [1-6]. Seven groups of six rats in each group were treated with vehicle, EESI (100,200 and 400 mg/kg, p. o.), Aspirin (50 and100 mg/kg, p.o.) and combination of Aspirin (50 mg/kg) and EESI (100 mg/kg, p.o.) one hour prior to Carrageenan injection. 0.1 ml of 1% Carrageenan was injected into the sub plantar tissue of left hind paw of each rat. Swelling of Carrageenan injected feet were measured at 0, 1, 2, 3,4 hr using Plethysmometer (Ugo Basile, Italy).

Cotton pellet granuloma in rats

The method of winter and Porter with slight modification was used to study chronic inflammation [7]. Seven groups of six animals in each group were taken, anaesthetized with ether. The axillary skin was shaved and disinfected with 70% ethanol. An incision was made and by a blunt forcep subcutaneous tunnels were formed and a sterilized cotton pellet (50 ± 1 mg) was placed in both axillas. The vehicle, test drug, EESI (100, 200, and 400 mg/kg, p.o.), standard Drug, Aspirin (50,100 mg/kg) and combination of Aspirin (50 mg/kg) and EESI (100 mg/kg) were administered for 7 consecutive days starting from day of cotton implantation. At 8th day rats were anaesthetized again and the cotton pellet (along with granular tissue formed around) were removed surgically and freed from extraneous tissue. The pellets were weighed immediately for wet weight. Then, pellets were dried in an incubator at 60° C until a constant weight was obtained.

Statistical Analysis

All values were shown as mean ± SEM. Statistical analysis was performed using one-way analysis of variance (ANOVA) followed by Dun net's t test. P<0.05 was considered statistically significant.

RESULTS AND DISCUSSION

The results obtained as mean increase in paw volume and percentage inhibition are shown in **Table 1**.

The results shown percentage inhibition of paw edema by EESI in dose (100, 200, 400 mg/kg) were 57.22%, 67.77% and 77.61% respectively. The values were 58.32% and 80.59% for aspirin in 50 and 100 mg/kg doses respectively. Whereas for aspirin (50) and EESI (100 mg/kg) combination it is 65.67%

Table 1. Anti-inflammatory activity (Carrageenan Induced Paw Edema Method).

Group	Treatment Dose(mg/kg, p.o)	Increase in paw volume (mean ± SEM) in ml	% inhibition of paw edema
I	Control	0.67 ± 0.18	-
II	EESI(100)	0.28 ± 0.08*	57.22%
III	EESI(200)	0.21 ± 0.07*	67.65%
IV	EESI(400)	0.16 ± 0.04**	77.61%
V	Aspirin(50)	0.28 ± 0.09*	58.31%
VI	Aspirin (100)	0.13 ± 0.03**	80.59%
VII	Aspirin(50) + EESI (100)	0.23 ± 0.07*	65.67%

One Way ANOVA f:6.3

df: 6,35

N=6 in each group p * 0.01 p** 0.001 compared to control

The results obtained as percentage inhibition of granuloma formation are shown in **Table 2**. The results shown percentage inhibition of granuloma formation with 100,200 and 400 mg/kg dose EESI are (14.43%, 23.43%, and 47.29%) respectively. The percentage inhibitions with aspirin

Table 2. Anti-inflammatory activity (Cotton Pellet Granuloma Method).

Group	Treatment (mg/kg)	Weight of granuloma (in mg)	% inhibition of granuloma formation
I	Control	74.28 ± 2.56	-
II	EESI (100)	59.85 ± 1.40*	14.43%
III	EESI (200)	50.85 ± 1.22*	23.43%
IV	EESI (400)	38.42 ± 0.99**	45.29%
V	Aspirin (50)	44.71 ± 0.74*	39.80%
VII	Aspirin (100)	33.85 ± 1.12**	54.21%
VIII	Aspirin(50)+EESI(100)	36.00 ± 1.04**	51.72%

One Way ANOVA f:25.52

df: 6,42

N=6 in each group p * 0.01 p** 0.001 compared to control

(50, 100 mg/kg) are (39.80% and 54.21%) respectively whereas for combination dose (aspirin, 50 and EESI 100 mg/kg) it is 51.72%.

In the present study EESI demonstrated a significant anti-inflammatory activity in both model of inflammation. Carrageenan induced rat paw edema has been a popular inflammatory model. It shows a biphasic response^[8]. The first phase is due to release of histamine and serotonin and second accelerating swelling is due to release of PG^[9-11]. In our study, EESI (100,200,400 mg/kg) significantly reduced edema induced by Carrageenan in all phases. Cotton pellet granuloma is a model of non-immunological types of inflammation and edema is due to mainly due to proliferative phase of inflammation^[12]. Efficacy of EESI in this model might be due to an increase in the synthesis of collagen and mucopolysaccharides and increase in the number of fibroblasts during granuloma tissue formation.

CONCLUSION

The present experimental study protocol showed that methanolic extract of *Haldina cordifolia* elicited significant anti-inflammatory activity in carrageenan induced paw edema and cotton pellet granuloma model. In both model they exhibited anti-inflammatory effect in a dose dependent manner which can be comparable with that of aspirin. The phytochemical analysis revealed the presence of terpenoids and flavonoids. The flavonoids have potent anti-inflammatory activity by inhibiting prostaglandin synthesis^[13-18]. So anti-inflammatory activity of *Sphaeranthus indicus* can be attributed to bradykinin and PG synthesis inhibition property of flavonoids

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