

**PRELIMINARY PHYTOCHEMICAL SCREENING AND ANTIPYRETIC ACTIVITY OF LEAF AND ROOT OF *HYGROPHILA SPINOSA* T. ANDERS**

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**Summary**

*Hygrophila spinosa* T. Anders (Acanthaceae) commonly known as 'Talmakhana' in Hindi is widely distributed throughout India, Srilanka, Burma, Malaysia and Nepal. In traditional system of medicine it is used as diuretic and for the treatment of rheumatism, jaundice, inflammation, pain, hepatic obstruction, gout, diabetes, bacterial infection etc. The present study deals with the preliminary phytochemical screening and antipyretic activity of alcoholic extract of the leaves and roots of *H. spinosa* T. Anders. Phytochemical screening revealed the presence of alkaloids, steroids, tannins, proteins, flavonoids and fats & oils in the leaf extract; and alkaloids, steroids, tannins, proteins, flavonoids, carbohydrates and fats & oils in the root extract. Antipyretic activity was evaluated using Brewer's yeast induced pyrexia in rats. Both the extracts at 200 and 400 mg/kg body weight dose significantly ( $p < 0.05$ ) reduced the increased rectal temperature. The extracts started reducing the elevated rectal temperature after 3 hr of treatment. At a dose of 400 mg/kg body weight, leaf extract and root extract reduced 79% and 83.8%, respectively, of the elevated rectal temperature compared to paracetamol (96.5%) after 6 hr. It is concluded that both the extracts are having antipyretic activity, but root extract showed slightly greater activity than leaf extract.

**Keywords:** Antipyretic, Brewer's yeast, *Hygrophila spinosa*, phytochemical screening, prostaglandin

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## **Introduction**

*Hygrophila spinosa* T. Anders syn. *H. auriculata* (Schum.) Hiene; *Asteracantha longifolia* (Linn.) Nees. [1] is a herb of wet places, 0.6 – 1.5 m tall, with axillary spines, leaves 9 x 1 cm, hairy, oblanceolate, in whorls. Flowers 2-3 cm long, purple-blue, bilabiate, in whorls. Fruits capsule, 8 mm long [2]. Seed oil contains uronic, palmitic, stearic, oleic and linoleic acids [3-4]. Apigenin-7-O-glucuronide and apigenin-7-O-glucoside are isolated from flowers [5]; lupeol, betulin and stigmasterol are isolated from plant collected from Saharanpur [6]. The roots of the plant are considered as cooling, diuretic, stimulating, anti-inflammatory and especially efficacious in dropsical conditions and in cases of stone or gravel in the kidney [7-8]. The roots, leaves and seeds are employed for jaundice, rheumatism, anasarca, and diseases of the urinogenital tract. The leaves are good for cough; applied for gleet, and in lumbago pains in the joints [9]. Usually most anti-inflammatory and analgesic drugs possess antipyretic activity. Hence, the present study is designed to evaluate the antipyretic activity of the leaf and root of *H. spinosa*, and to correlate the activity with the group of phytoconstituents present.

## **Materials and Methods**

### ***Plant material***

The plants were collected from Berhampur, Orissa in the winter season. The taxonomical identification of the plant was done by Dr. N.K. Dhal, scientist, Regional Research Laboratory, Bhubaneswar, Orissa and a voucher specimen was deposited in the herbarium (vide access no. 9999). The leaves and roots were separated and dried under shade, coarsely powdered and stored in air tight container for further use.

### ***Preparation of extracts***

The coarsely powdered leaves and roots were extracted with alcohol separately by maceration. Extracts were concentrated using rotary vacuum evaporator. The semisolid mass obtained were stored in desiccator until further use.

### ***Preliminary phytochemical screening***

The extracts were screened for various groups of phytoconstituents viz. alkaloids, anthraquinone glycosides, cardiac glycosides, steroids, tannins, proteins, saponins, flavonoids, mucilage, fats & oils, carbohydrates and organic acids [10-12].

### ***Animals***

Wistar rats of both sexes, weighing 150 – 200 g were used for the study. The animals were kept in polypropylene cages in a room maintained under controlled atmospheric conditions. The animals were fed with standard diet and had free access to clean drinking water. The experimental protocol was approved by the Institutional Animal Ethics Committee (IAEC).

**Antipyretic activity**

The animals were divided into six groups containing six rats each. Fever was induced by administration of 15% w/v Brewer's yeast suspension (s.c.) below the nape of the neck [13, 14]. The rectal temperature was recorded using telethermometer immediately before and 18 hr after Brewer's yeast injection [15]. After 18 hr of yeast injection different groups received vehicle (1% v/v Tween 80 in distilled water) or different extracts (200 or 400 mg/kg body weight) or standard drug (Paracetamol, 150 mg/kg body weight) through oral route. The rectal temperature was then recorded for an observation period of 6 hrs.

**Results**

The results of preliminary phytochemical analysis showed the presence of alkaloids, glycosides, carbohydrates, reducing sugar, steroids, fats & oils, flavonoids, proteins and tannins in both the extracts (Table 1).

**Table 1.** Preliminary phytochemical screening of the alcoholic extract of leaf and root of *H. spinosa*

Group of Phytoconstituent	Leaf extract	Root extract
Alkaloids	+	+
Glycosides	+	+
Anthraquinone glycosides	-	-
cardiac glycosides	-	-
Steroids	+	+
Tannins	+	+
Proteins	+	+
Saponins	-	-
Flavonoids	+	+
Mucilage	-	-
Fats & oils	+	+
Carbohydrates	+	+
Organic acids	-	-
Reducing sugar	+	+

+ indicates present; - indicates absent

In antipyretic activity study the experimental rats showed a mean increase of about 1.25<sup>0</sup>C in rectal temperature, 18 hr after Brewer's yeast injection. Both the extracts showed significant (p<0.05) antipyretic activity and reduction of the elevated rectal temperature started after 3 hr of treatment (Table 2). The initial and final rectal temperatures (<sup>0</sup>C) in the group treated with leaf extract (400 mg/kg body weight) and root extract (400 mg/kg body weight) were 35.68 ± 0.16 & 34.85 ± 0.13, 36.20 ± 0.29 & 34.90 ± 0.25 respectively, compared to 35.71 ± 0.19 & 34.60 ± 0.15 in paracetamol treated group.

**Table 2.** Effect of alcoholic extract of leaf and root of *H. spinosa* on Brewer's yeast-induced pyrexia in rats

Treatment	Dose (mg/kg body weight)	Before yeast	After yeast	After treatment			
				1 hr	3 hr	5 hr	6 hr
Control	-	34.75 ±	35.81 ±	35.90 ±	35.91 ±	35.83 ±	35.81 ±
Paracetamol	150	0.12 34.56 ±	0.13 35.71 ±	0.13 34.68 ±	0.10 34.60 ±	0.11 34.58 ±	0.12 34.60 ±
Leaf extract	200	0.17 34.73 ±	0.19 36.33 ±	0.13* 36.00 ±	0.17* 35.75 ±	0.18* 35.50 ±	0.15* 35.30 ±
	400	0.13 34.63 ±	0.19 35.68 ±	0.18 35.40 ±	0.15* 35.16 ±	0.16 35.10 ±	0.14* 34.85 ±
Root extract	200	0.13 34.73 ±	0.16 35.83 ±	0.12 35.71 ±	0.09* 35.40 ±	0.15* 35.21 ±	0.13* 34.95 ±
	400	0.10 34.65 ±	0.19 36.20 ±	0.22 36.00 ±	0.17* 35.45 ±	0.18* 35.23 ±	0.19* 34.90 ±
		0.12	0.29	0.29	0.29*	0.26*	0.25*

Values represent Mean ± SEM (n=6); \*p<0.05 significant compared with control group

### Discussion

Yeast-induced pyrexia is called pathogenic fever and its etiology involves production of prostaglandins [16]. The alcoholic extract of both leaf and root of *H. spinosa* showed significant antipyretic activity and the effects are comparable to standard drug (Paracetamol). So the antipyretic activity may be by inhibition of prostaglandin synthesis. Again the extracts contain alkaloids, glycosides, flavonoids and steroids, the antipyretic potential of which have been reported in various studies [17-19]. Therefore, the activity may be due to presence of the above group of phytoconstituents.

### Conclusion

The result of the present study confirmed the antipyretic activity of alcoholic extract of the leaves and roots of *H. spinosa*. However, further investigation is required to separate the active fraction(s)/constituent(s) responsible for the activity and to establish the mechanism of action.

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