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PRELIMINARY INVESTIGATION ON ANTIPYRETIC ACTIVITY OF *CUSCUTA REFLEXA* IN RATS

Sanjib Bhattacharya*, Bodhisattva Roy

1. Bengal School of Technology (A College of Pharmacy), Sugandha, Hooghly, West Bengal, (India)

Corresponding Author's E-mail: - sakkwai@yahoo.com

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Abstract

In present study, the antipyretic activity of aqueous and ethanol extracts from *Cuscuta reflexa* Roxb. (Cuscutaceae) 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 h of treatment in a dose related manner. At the dose of 400 mg/kg body weight the aqueous and ethanol extract reduced 79 % and 83.8 % respectively of the elevated rectal temperature as compared to reference drug paracetamol (96.5 %) after 6 h of treatment. It was therefore concluded that both the extracts of *C. reflexa* demonstrated antipyretic activity, the ethanol extract was found to be slightly potent than the aqueous extract.

Key words: Antipyretic, Brewer's yeast, *Cuscuta reflexa*, phytochemical analysis, prostaglandin.

Introduction

Cuscuta reflexa Roxb. (Cuscutaceae), commonly known as *Akashabela, Amarabela*, in Hindi, *Swarnalata* in Bengali and *Akakhi-lata* in Assamese is a parasitic climber occurring throughout the plains of India up to 3000 m. In India, the plant is traditionally used for various medicinal purposes. The seeds are used as sedative, emmenagogue, diuretic; useful in disease of the liver and spleen, chronic fevers, griping, hiccough. The whole plant infusion is given in ophthalmia, the decoction in biliousness as a purgative. The stem is used as a purgative. The plant juice was given in combination with other purgative decoction. The rural people of India

use the juice of plant as inhaled for treating jaundice and warm paste is applied in rheumatism and gout and other affected parts of the body, and the paste of whole plant is applied for relieving headache [1-4]. As there are no experimental reports on antipyretic activity on *C. reflexa*, present study attempts to evaluate its antipyretic effect in rats.

Materials and Methods

Plant material

The entire plants of *Cuscuta reflexa* Roxb. were collected during the month of November 2006 from the Herbal Garden, Department of Life Sciences, Dibrugarh University, Dibrugarh, Assam, India. The species was identified by Dr. M. Islam, Department of Life sciences, Dibrugarh University, and a voucher specimen herbarium of the said plant was preserved for future reference. The plant material was shade dried at room temperature (24-26 ºC) and ground mechanically into a coarse powder.

Drugs and Chemicals

All the chemicals used were of analytical grades, obtained from commercial suppliers. Paracetamol was obtained as gift sample from Mepro Pharmaceuticals Pvt. Ltd., Surendranagar, Gujarat, India. Double-distilled water from all-glass still was employed throughout the study.

Preparation of extracts

The powdered plant materials were extracted with distilled water and 95 % v/v ethanol separately by maceration at room temperature (24-26 ºC) for 7 days. Then the extracts were filtered and concentrated using rotary vacuum evaporator at 45 ºC. The semisolid mass thus obtained were stored in desiccator until further use.

Preliminary phytochemical analysis

The extracts were qualitatively analyzed for presence of different phytoconstituents as per usual methods [5-7].

Animals

Wistar rats of both sexes, weighing 150-200 g were procured from registered breeders (Rita Ghosh & Co., Kolkata) and used for the study. The animals were kept in polyacrylic cages with not more than four animals per cage in a room maintained under standard controlled atmospheric conditions. They were allowed free access to standard dry pellet diet (Hindustan Lever, Kolkata, India) and water *ad libitum*. The rats were acclimatized to laboratory conditions for 10 days before commencement of the experiment.

Evaluation of antipyretic activity

The animals were divided into six groups (n = 6). Fever was induced by administration of 15 % w/v Brewer's yeast suspension subcutaneously below the nape of the neck [8, 9]. The rectal temperature was

recorded using telethermometer immediately before and 18 h after Brewer's yeast injection [10]. After 18 h of yeast injection different groups received vehicle (1% v/v Tween 80 in distilled water), aqueous and ethanol extracts (200 and 400 mg/kg body weight) and reference drug (paracetamol, 150 mg/kg body weight) through oral route. The rectal temperature was then periodically recorded for an observation period of 6 h.

Statistical analysis

The experimental values were expressed as mean ± standard error of mean (SEM). Degree of signicavity was assessed by Student's't' test. $p < 0.05$ was considered as significant.

Results

The results of preliminary phytochemical analysis showed the presence of saponins, flavonoids, organic acids viz. citric acid and malic acid in both extracts from *C. reflexa.*

In antipyretic activity study the experimental rats showed a mean increase of about 1.25 ^{0}C in rectal temperature 18 h after Brewer's yeast injection. Both the extracts showed significant ($p < 0.05$) antipyretic activity and reduction of the elevated rectal temperature after 3 hr of treatment (Table 1) in a dose dependent manner. The initial and final rectal temperatures (^{0}C) in the group treated with aqueous extract (400 mg/kg body weight) and ethanol extract (400 mg/kg body weight) were found to be 35.68 ± 0.16 and 34.85 ± 0.13, 36.20 ± 0.29 and 34.90 ± 0.25 respectively, compared to 35.71 ± 0.19 and 34.60 ± 0.15 in paracetamol (reference drug) treated group. At the dose of 400 mg/kg body weight the aqueous extract and ethanol extract reduced 79% and 83.8% respectively of the elevated rectal temperature as compared to reference drug paracetamol (96.5 %) after 6 h. Hence, the ethanol extract was found to be slightly potent than the aqueous extract from *C. reflexa*.

Table 1: Effect of *C. reflexa* extracts on Brewer's yeast- induced pyrexia in rats

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

Values represent Mean (ºC) ± SEM (n = 6); *p< 0.05 when compared with control group.

Discussion

Fever may be due to infection or one of the sequels of tissue damage, graft rejection and/or other disease states. Antipyretics are the agents which reduce the elevated body temperature. Yeast-induced pyrexia is called pathogenic fever and its etiology involves production of prostaglandins, which set the thermoregulatory centre at a lower temperature. The production of prostaglandins, mainly the most potent pyretic agent, PGE_2 appears to be a final pathway responsible for fever production induced by several pyrogens. The antipyretic activity is generally exhibited as one of the properties of nonsteroidal anti-inflammatory drugs, resulting from their inhibitory effect on prostaglandin biosynthesis in the central nervous system [11]. Both the aqueous and ethanol extracts of C. reflexa dose dependently exhibited significant ($p < 0.05$) antipyretic activity in yeast-induced elevation in body temperature in rats and the effects are comparable to the reference antipyretic drug (paracetamol). The ethanol extract was found to be slightly potent than the aqueous extract. It appears that the observed antipyretic activity of C. reflexa may be due to inhibition of prostaglandin synthesis. Again the extracts contain flavonoids and saponins, the antipyretic potential of which have been reported in various studies [12-14]. Therefore, the activity may be due to presence of the above group of phytoconstituents in *C. reflexa.*

Conclusion

The result of the present preliminary study confirmed the antipyretic activity of C. reflexain rats. However, further investigation is required to separate the active fraction(s)/constituent(s) responsible for the activity and to ascertain the mechanism(s) of antipyretic action.

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