



Antipyretic Activity of *Swertia chirayita* in Methanolic Extract

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ABSTRACT

The present study was carried out to investigate antipyretic activity of the whole plant of *Swertia chirayita* in methanolic extract. The antipyretic activity was evaluated by using Brewer's yeast induced pyrexia method. The methanolic extract of *Swertia chirayita* plant was administered orally at a dose of 100 mg/Kg and 200 mg / Kg of body weight to two groups of animals respectively. Rectal temperature was recorded by clinical thermometer after 0, 2, and 4 hrs after drug administration. Statistical analysis: Data are expressed as \pm S.E.M. statistical difference between mean were determined by one-way ANOVA $P < 0.05$ were as considered significant. The results obtained from extracts and standards treated groups were compared with the control group. A significant reduction in the yeast elevated rectal temperature was observed in the test drug. The present investigation concluded that the *Swertia chirayita* plant have significant antipyretic activity and can be used as antipyretic drug in fever.

Keywords: *Swertia chirayita*, Methanolic extract, antipyretic.

INTRODUCTION

Medicinal plants are the only easily reach health care alternative for most of the people and traditional medicines remained a part of our important health system. Fever is one of the most common signs of illness and it is best defined as an increase in body temperature over what is normal for a given individual at that particular time of day¹. The normal body temperature is regulated by a center in the hypothalamus, which ensures a balance between heat loss and heat production. Fever occurs when there is a disturbance of this hypothalamic thermostat that leads to the set point of body temperature being raised². Antipyretic are drugs, which reduce elevated body temperature. Regulation of body temperature requires a delicate balance between the production and loss of heat, and the hypothalamus regulates the set point at which body temperature is maintained. In fever, this set point is elevated and drug like Paracetamol do not influence body temperature when it is elevated by factors like exercise or increase in ambient temperature. Antipyretic activity is commonly mentioned^{3,4} as a characteristic of drugs or compounds which have an inhibitory effects on prostaglandin-biosynthesis⁵.

Swertia chirayita (Family Gentianaceae,) is one of the important traditional medicinal plant, an erect annual or perennial herb found in Himalaya and Meghalaya at an altitude of 1200-1300meters⁶. The entire plant is used in medicine; however the root is mentioned to be the most powerful part. It has been reported to have anti-inflammatory⁷, anti-viral⁸, antihelmintic⁹, anticarcinogenic¹⁰, hepatoprotective,¹¹ hypoglycemic^{12, 13} wound healing activity as well as antibacterial activity.

In the present study antipyretic activity of *Swertia chirayita* was evaluated in methanolic extract by Brewer's yeast induced hyperpyrexia method in albino mice.

MATERIALS AND METHODS

Collection of plant

The plant *Swertia chirayita* was collected in September from the Kauntalani Nursery, which is located at N-30° 45'123" Latitude and E- 077° 53'00: and is 2580 m.amsl. [Fortrex 201 GPS]. Kauntalani Nursery belongs to the Chakrata Forest Division, District Dehra Dun, Uttarakhand.

Identification of plant

The plant was first identified at the field using standard keys and descriptions. All the plants were packed in the Kraft paper and herbarium sheets were prepared. Its botanical identity was further confirmed and authenticated by the plant taxonomist of Department of Botany, Forest Research Institute, Dehradun. The accession number 16430 has been assigned to the specimen submitted to FRI herbarium for identification and is identified as *Swertia chirayita* (Roxb.Ex Flem)Karst.

Extraction of Plant

The dried powdered of whole plant of *Swertia chirayita* (50 g) of Chakrata site was extracted with Methanol by Soxhlet apparatus. After extraction, extract was filtered through Whatman filter paper and reduced to small volume in a flash rota evaporator under reduced pressure. This extract was further examined for their Antipyretic activity.



Drugs and Reagents

Paracetamol was used as the standard drug, which was gifted by Panacea Biotech. Carboxy methyl cellulose which was purchased from LOBA Chemmie. Pvt Ltd Mumbai, and Brewer's yeast was purchased from local market.

Preparation of Fever Inducing Agent

In this investigation 0.5 % Carboxy methyl cellulose solution was prepared in normal saline. 15 % of yeast was suspended in this prepared 0.5 % w/v Carboxy methyl cellulose solution.

Experimental Animals

Young Albino mice (18–25 g) of either sex were used in the present study which was acquired from Shri Guru Ram Rai Institute of Technology and Science, Dehradun. All animals were kept in the animal house under 12/12 hr light and dark cycles with free access of food and water ad libitum. All the experiments were performed after the approval of animal ethical committee and experiments were performed as per guidelines of care and use of experimental animals and approved by Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA).

Experimental Design

Twenty four Albino mice (18–25 g) were employed in this activity. Four groups were designed, each group comprised of six animals. In all the groups 15% yeast (0.1ml s.c) was administered.

Group I

Normal saline (10 ml/Kg, i.p) was administered.

Group II

Test drug [100 mg/kg orally Methanol extract of *Swertia chirayita*] was administered.

Group III

Test drug [200 mg/kg orally Methanol extract of *Swertia chirayita*] was administered.

Group IV

Paracetamol (10mg/kg i.p) was administered.

Antipyretic Studies (Brewer's Yeast Induced Hyperpyrexia Method)

The antipyretic activities of extract were evaluated using Brewer's yeast induced pyrexia¹⁴ in albino mice. Before yeast injection the basal rectal temperature of mice was recorded by inserting digital clinical thermometer to a depth of 2 cm into the rectum and after recording the temperature mice were given subcutaneous injection of 0.1 ml, subcutaneous of 15 % w/v yeast suspended in 0.5 % w/v methyl cellulose solution for elevation of body temperature of mice. Mice were then returned to their housing cages. After the 24 hours of yeast injection, the control, standard drug and test drugs were administered in to respective groups. Paracetamol was administered orally to standard group of animals. The methanolic extract of *Swertia chirayita* plant was administered orally at a dose of 100 mg/kg and 200 mg/kg of body weight of respective groups. Rectal temperature was recorded by clinical thermometer after 0, 2, and 4 hr after drug administration.

Statistical Analysis

Data an expressed as \pm S.E.M. statistical difference between mean were determined by one-way ANOVA $P \leq 0.05$ were as considered significant.

RESULTS AND DISCUSSION

The effect of Methanolic extract of *Swertia chirayita* against antipyretic activity has been shown in Table 1.

The data obtained after the experiment revealed that the rectal temperature of 37.2°C at 0 hour was markedly elevated to 38°C in each groups for 24 hr after the administration of subcutaneous injection of yeast suspension.

The drug treatment with extracts at the dose of 100 mg/kg and 200 mg/kg body weight and the administration of Paracetamol decreased the yeast induced body temperature in rats after 2 and 4 hour interval of drug administration. A significant reduction in the yeast elevated rectal temperature was observed in the test drug as compared to control group. The graphical presentation of antipyretic activity of *Swertia chirayita* has been presented in Figure 1.

Table 1: Antipyretic effect of methanolic extract of *Swertia chirayita* in rats

Drug treatment	Normal body temperature	Body temperature after 24 hr administer of yeast	Body temperature after drug administer	
			2 hr	4 hr
Control	37.8 \pm 0.14	39.1 \pm 0.29 ^a	39.0 \pm 0.15	38.9 \pm 0.18 ^b
Test-1(100 mg/kg)	38.1 \pm 0.24	39.5 \pm 0.21 ^a	37.8 \pm 0.21 ^b	37.7 \pm 0.17 ^b
Test-2(200 mg/kg)	37.0 \pm 0.19	39.6 \pm 0.14 ^a	38.0 \pm 0.24 ^b	37.1 \pm 0.19 ^b
Standard	38.0 \pm 0.24	39.8 \pm 0.21 ^a	37.4 \pm 0.19 ^b	37.1 \pm 0.20 ^b



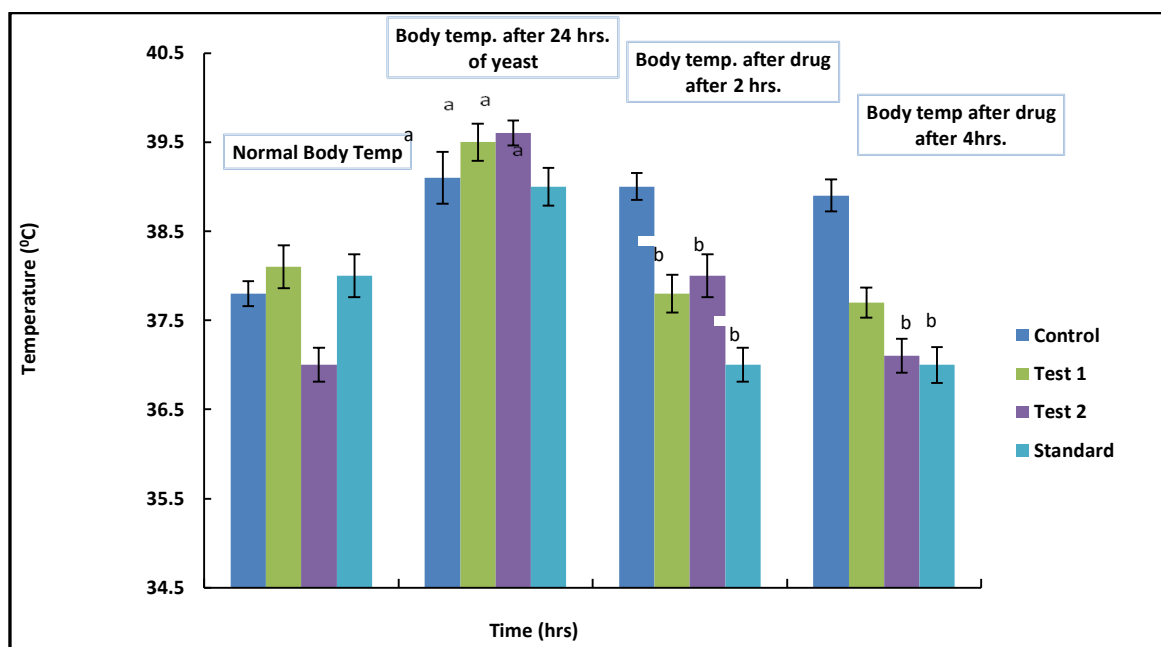


Figure 1: Graphical presentation of Antipyretic activity of *Swertia chirayita*.

(The mean standard error value of each group (n=6) represent mean \pm SEM. a=p \leq 0.05 Vs normal body temperature of respective group. b=p \leq 0.05 Vs body temperature after 24 hour administer of yeast of respective group)

The impact of the Yeast Induced fever is called pathogenic fever. The antipyretic activity studies revealed that, the Methanolic extract of the plant possess a significant antipyretic effect against elevated rectal temperature induced by yeast suspension in rats. The effectiveness of antipyretic activity was observed at doses of 100 mg/kg and 200 mg/kg and the effects were comparable with the standard drug Paracetamol. The antipyretic effects increased with time, upto 4 hr and it was found to be statistically significant when compared with the control group. The present results showed that the *Swertia chirayita* at dose 200mg/kg at 4 hr have significant antipyretic activity and can be used as antipyretic drug in fever. Various studies¹⁵ have reported that the presence of Alkaloids and Flavonoids are responsible for antipyretic activity in the plant. The phytochemical analysis of methanol extract gives the confirmatory results. Hence, the *Swertia chirayita* plant can be used as harmless antipyretic drug.

CONCLUSION

The antipyretic activities of methanolic extract of *Swertia chirayita* supports that it can be used in the management of fever by traditional medicine practitioners. Hence from the present investigation it may be concluded that the methanolic extract of *Swertia chirayita* plant have antipyretic activity. Further, study regarding isolation and characterization of active principle responsible for antipyretic activity are required.

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REFERENCES

1. S. M. Wolff, A. S. Fauci, D. C. Dale, "Unusual etiologies of fever and evaluation", *Annu. Rev. Med.*, vol. 26, 1975, pp. 277-281.
2. H. P. Rang, M. M. Dale, J. M. Ritter, "Anti-inflammatory and immuno-suppressant drugs", *International Pharmacology*, Churchill Livingstone, Edinburgh, 4th Ed., 1999, pp. 229-47.
3. N. V. Chandrasekaran, H. Dai, K. L. Roos, N. K. Evanson, J. Tomsik, T. S. Elton, D. L. Simmons, and Cox-3, a cyclooxygenase 1 variant inhibited by acetaminophen and other analgesic /antipyretic drugs: cloning structure and expression, *Proc. Natl. Acad. Sci. USA*, vol. 99, no. 21, 2002, pp. 13926- 31.
4. M. S. Begum, M. H. M. Ilyas, A. Burkanudeen, "Antipyretic activity of extract of leaves of *Justicia tranquenbarium*(Linn) in albino mice" *The Pharmacist*, vol. 4, no. 1, 2009, pp. 49-51.
5. A. R. S. Santos, V. C. Filho, R. Niero, A. M. Viana, F. N. Moreno, and M. M. Campos, " Analgesic effects of callus culture extracts from selected species of *Phyllanthus* in mice", *J. Pham Pharmacol.*, vol 46 no 9, 1994, pp. 755-759.
6. Kirtikar K. R. and Basu B. D., *Indian Medicinal Plants*, 2nd Ed., vol. III, Allahabad, 2006, pp , 1664–1666.
7. Islam C. N., Banerjee M. K., and Das P.C., Preliminary studies on the anti-inflammatory effects of *Swertia chirata* in albino rats, *Indian J. Pharmacol.*, 27, 1995, 37–39.
8. Verma H., Patil P. R., Kolhapure R. M., Antiviral activity of the Indian medicinal plant extract *Swertia chirata* against herpes simplex viruses: a study in vitro and molecular approach, *Ind J Med Microbiol*, 26, 2008, 322-6.

9. Iqbal Z., Lateef M., Khan M. N., et al, Antihelminthic activity of *Swertia chirata* against gastrointestinal nematodes of sheep, *Fitothérapie*, 77, 2006, 463-5.
10. Saha P., Mandal S., Das A., Das P. C., and Das S., Evaluation of anti-carcinogenic activity of *Swertia chirata* Buch. Ham, an Indian medicinal plant on DMBA-induced mouse skin carcinogenesis model, *Phytothe. Res.*, 18, 2004, 373-378.
11. Mukherjee S., Sur A., and Maiti B. R., Hepatoprotective effect of *Swertia chirata* on rat, *Indian Journal of Experimental Biology*, 35(4), 1997, 384-388
12. Bajpai M. B., Asthana R. K., Sharma N. K., et al, Hypoglycemic effect of swerchirin from the hexane fraction of *Swertia chirayita*, *Planta Med*, 57, 1991, 102-4.
13. Saxena A. M. et al., "Mode of action of three structurally different hypoglycemic agents: a comparative study", *Indian J Exp Biol*, 34, 1996, 351-355.
14. B.S. A. Kumar, K. Lakshman and K. N. Jayaveera, "Comparative antipyretic activity of methanolic extracts of some species of *Amaranthus Bagepalli*", *Asian Pacific Journal of Tropical Biomedicine*, 2011, pp.47-50.
15. M. Jayabharathi and M. Chitra, "Evaluation of anti-inflammatory, analgesic and antipyretic activity of *Moringa concanensis* Nimmo", *J. Chem. Pharm. Res*, vol. 3, no. 2, 2011, pp. 802-806.

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