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REVIEW ARTICLE

ANTIPYRETIC ACTIVITY OF METHANOL LEAF EXTRACT OF *MAGNOLIA NILAGIRICA* (ZENKER) FIGLAR. IN WISTAR ALBINO RATS

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ABSTRACT

The study was conducted to evaluate the antipyretic activity of methanolic leaf extract of *M. nilagirica* by using yeast-induced pyrexia method. The results revealed that the different doses of methanolic leaf extract showed the potential to lower the body temperature up to 2 hours, following its administration. The effect of extract on yeast-induced pyrexia rats showed the rectal temperature elevated to 39.76 °C, 24 h after the subcutaneous injection of yeast suspension and it decreased to 36.43 °C within 6 hours of leaf extract (100 mg/kg) treatment. The extract thus showed a significant antipyretic activity against the yeast-induced pyretic model.

Keywords:

Antipyretic activity,
Methanolic leaf extract,
Magnolia nilagirica.

INTRODUCTION

Pyrexia or fever is caused as a result of infection, tissue damage, inflammation, graft rejection, malignancy or due to microbial infections such as bacteria or viruses triggered the body's defence mechanisms. Normally, the infected tissue initiates the synthesis of pro-inflammatory mediators viz., prostaglandin E2 (PGE2) (Spacer and Breder, 1994). The antipyretics like acetaminophen, aspirin, and other non steroidal anti-inflammatory drugs are generally used all over the world (Weissmann, 1991). These antipyretic drugs inhibited the expression of COX-2 and reduced the elevated body temperature by inhibiting PGE2 biosynthesis (Cheng et al., 2005). *Magnolia nilagirica* is an endemic tree species of the family Magnoliaceae. It is threatened by habitat loss, distributed in the Nilgiri Hills, the Western Ghats of India. The species of this family is reported to have several pharmacological activities like antitumor, anti-inflammatory, antiulcer, antipyretic, insecticidal, antimicrobial, antioxidant, anti-infective, anti-fertility, antihelminthic and leishmanicidal activities. Therefore the present study was undertaken to investigate the *in vivo* antipyretic activity of methanolic leaf extract *M. nilagirica* leaf extract of which it could be a cost effective alternative attempt for the development of an effective antipyretic agent.

MATERIALS AND METHODS

Collection of plant

Magnolia nilagirica (Zenker) Figler belongs to the family Magnoliaceae was collected from natural forest of Kotagiri,

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Nilgiri Hills, Tamilnadu. The specimen was identified by Dr. M. Murugesan, Scientist: B, Botanical Survey of India, Shillong. A voucher specimen was deposited in the Department of Botany, Kongunadu Arts and Science College, Coimbatore (KASC/BOT/0017).

Preparation of plant extract

The leaves of *Magnolia nilagirica* were washed with copious amount of water and shade dried, then powdered using a mechanical grinder to obtain coarse powder. About 250g of the powder was defatted with petroleum ether and residue was collected. Then, the residue was re-extracted with methanol in a Soxhlet apparatus. The extract was reduced to dryness using vacuum evaporator under reduced pressure and are used further for antipyretic studies (Khanna and Chaudhury, 1968).

Animals

Normal healthy male Wistar albino rats (180-240g) were used for the present study, Rats were housed under standard environmental conditions at the temperature of 25±20° C in light and dark periods (12:12h). The rats were fed with standard pellet diet (Goldmohur brand, MS Hindustan Lever Ltd., Mumbai, India) and water *ad libitum*. The experimental studies were carried out with the approval and as per the ethical committee guidelines (vide no.659/02/a/CPCSEA).

Antipyretic activity

Initial basal rectal temperatures of the animals were measured and then the animals were given sub-cutaneous injection of 20% aqueous suspension of dried yeast in 2% gum acacia at a dose of 20 ml/kg below the nape of the neck. After 18 h of yeast injection, the animals were restrained in individual cages

for recording their rectal temperatures. Rectal temperatures were obtained by insertion of digital clinical thermometer. Thermometer was inserted to a constant depth of 3 cm. The animals were then grouped into five groups of six animals. In each group the plant extract and known standard drugs were administered orally by using an intragastric catheter tube (IGC). Temperature was recorded at a hourly intervals upto 23 h after yeast injection (Burn, 1952).

Their results were comparable to that of the standard drug, Paracetamol. Fever is a complex physiologic response triggered by infections and aseptic stimuli. Yeast induced fever is due to the increase in concentration of prostaglandin E2 (PGE2) and release in inflammatory mediators like cytokines such as IL-1-IL-6, TNF etc. Elevation in body temperature contributes to a considerable alteration in the firing rate of neurons in the hypothalamus.

Table 1. Effect of methanolic leaf extract of *M. nilagirica* leaf on the Antipyretic activity in Brewer's yeast induced pyrexia rats

Groups	Rectal Temperature in °C after 18hrs of Yeast Injection(Mean± SEM)					
	-18 th hr	0 th hr	1 hr	2 hr	3 hr	6 hr
Group I	36.24±0.34	38.38±0.22	39.08±0.27	39.25±0.12	39.48±0.26	39.87±0.32
Group II	37.38±0.46	39.34±0.92	37.12±0.43	36.83±0.13*	36.02±0.31*	35.27±0.52**
Group III	37.54±0.11	39.76±0.24	38.11±0.23	37.57±0.46*	37.02±0.26*	36.43±0.37*
Group IV	37.66±0.41	39.53±0.92	38.12±0.19	37.73±0.48*	36.86±0.21*	36.04±0.21*
Group V	37.83±0.13	39.98±0.56	37.42±0.48	36.27±0.82**	35.78±0.89**	35.11±0.48**

Experimental rats

Group I: Rats received normal saline and treated as control on the day of experiment by using an intragastric catheter tube (IGC).

Group II: Rats received suspension on via subcutaneous injection (10ml/kg) and standard drug paracetamol (150mg/kg b.w.), orally

Group III: Rats treated with 100 mg/kg of *M. nilagirica* leaf extract on the day of the experiment by using IGC.

Group IV: Rats treated with 200 mg/kg of *M. nilagirica* leaf extract on the day of the experiment by using IGC.

Group V: Rats treated with 400 mg/kg of *M. nilagirica* leaf extract on the day of the experiment by using IGC.

RESULTS

Antipyretic potential of methanolic leaf extract of *M. nilagirica* was evaluated by determining its effect on yeast-induced pyrexia in rats. The methanol extract of leaf provide moderate to marked anti-pyretic activity, in a dose-dependent manner. The extract at different doses caused lowering of the body temperature upto 6 h following its administration. The effect of methanol extract on yeast-induced pyrexia shows that the rectal temperature was markedly elevated to 39.87°C, 24 h after the subcutaneous injection of yeast suspension and it gradually decreased to 37.57°C within 2 hours of leaf extract (100 mg/kg b.w.) treatment. These results were often comparable to that of the standard drug, paracetamol. At the dose of 100 and 400 mg/kg b.w. marked anti-pyretic activity was detected which were significantly different than the controls ($p < 0.05$) (table 1). Generally, it was revealed that all concentrations of methanol extract of *M. nilagirica* leaf showed marked anti-pyretic activity. These results reveal that methanol extract of *M. nilagirica* exhibited marked antipyretic activity as compared with standard paracetamol.

DISCUSSION

In this context, the effect of methanol extract of *M. nilagirica* in rats were evaluated and it decreased yeast induced elevated body temperature in a concentration dependent manner.

Therefore it is evident that anti pyretic drugs exert its action through the inhibition of prostaglandin synthetase within the hypothalamic region [2]. The plausible mechanism for the antipyretic activity of the methanolic extract of *M. nilagirica* is due to the cyclooxygenase inhibitory activity. Furthermore, presence of substantial levels of phytochemical compounds such as alkaloids, flavonoids etc. in this extract might be regarded as a principle downstream mediator of fever. Therefore the antipyretic activity observed in this study could be attributed to the presence of flavonoids. The study, therefore, supports the folkloric claims of the traditional medicinal practitioners as a remedy for fever.

Conclusion

The present study suggest that the plant *Magnolia nilagirica* could be a potential source as natural antipyretic activity that could have great importance to reduce the fever.

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