ORIGINAL ARTICLE

Evaluation of anti-pyretic potential of seeds of *Moringa oleifera* Lam

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A study was carried out to evaluate the anti-pyretic effect of an ethanol extract of seeds, of *Moringa oleifera* Lam. belonging to the family of *Moringiaceae*, at normal body temperature and yeast-induced pyrexia, in albino rats. An yeast suspension (10 ml/kg body wt.) increased rectal temperature 19 hours after the subcutaneous injection. The ethanol extract of *Moringa oleifera*, at doses of 100, 200 and 300 mg/kg body wt. p.o., showed significant dose-dependent reduction in normal body temperature and yeast-provoked elevated temperature. The effect extended up to five hours after drug administration. The anti-pyretic effect of the ethanol extract of *Moringa oleifera* was comparable to that of paracetamol (150 mg/kg body wt., p.o.), a standard anti-pyretic agent.

Key words: Anti-pyretic effect, ethanol extract, *Moringa oleifera*

INTRODUCTION

Moringa oleifera Lam. (*Moringiaceae*) is grown in the subtropical parts of India, in the Western Himalayas. It is known as Drumstick in English, Mungna in Hindi and Shevgi in Marathi,[1] The plant contains 4-hydroxymellein, vanillin, β-sitosterol, octacosanomic acid, moringine, moringinine, indole acetic acid and carotene.[2] Dried seeds are used in ophthalmic preparation, venereal affection, as anti-inflammatories, purgatives[3] and in a tonic. The methanol extract of the leaf of *Moringa oleifera* Lam. is used as an analgesic.[4] The seeds are considered antipyretic, acrid, bitter and sometimes used to treat venereal affections. The aim of this study is to screen the effect of seeds of *Moringa oleifera* Lam. as an analgesic and antipyretic.[5]

MATERIALS AND METHODS

Plant Material

Moringa oleifera Lam. seeds were collected from the Satpuda ranges, in the Jalgaon district of Maharashtra, India, and identified by the Botanical Survey of India, Pune. The voucher specimen has been retained in our laboratory for future reference no. (BSI/WC/Tech/2005/730). The seeds were dried under controlled temperature, powdered and passed through a 40-mesh sieve.

Extraction Procedure

The powdered plant material was extracted using 90% ethanol, because ethanol extract is generally effective for the activity and also various chemical constituents may be present in the ethanol extract. The solvent was completely removed by vacuum distillation to yield a reddish-brown residue (yield 10.20%, w/w, with respect to dry starting material). This ethanolic extract of *Moringa oleifera* was examined chemically and was observed to contain steroids, triterpenoid, alkaloids and tannins. These constituents were confirmed using thin-layer chromatography (TLC). A weighed amount of the dried ethanol extract of the seeds of *Moringa oleifera* was suspended in 2% aqueous Tween 80 solution and used for the present study.

Animals Used

Adult albino rats (Wistar strain) of either sex, weighing 180-200 g each, were used. The animals were maintained under suitable nutritional and environmental conditions throughout the experiment.

Study on Normal Body Temperature

Rats of either sex were divided into four groups of six each. The body temperature of each rat was measured rectally at predetermined intervals before and five hours after administration of either 2% aqueous Tween 80 solution (control) or ethanol extract of *Moringa oleifera* at oral doses of 100, 200 and 300 mg/kg body wt.

Induction of Yeast-Induced Pyrexia

The rats were divided into five groups of six each. The normal body temperature of each rat was measured rectally at predetermined intervals and recorded.[6] The rats were trained to remain quiet in a restraint cage.

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A thermistor probe was inserted 3-4 cm deep into the rectum and fastened to the tail by adhesive tape. Temperature was measured on a digital thermometer. After measuring the basal rectal temperature, the animals were injected subcutaneously with 10 ml/kg body wt. of 15% w/v yeast, suspended in 0.5% w/v methylcellulose solution. The rats were then returned to their housing cages. Nineteen hours after the yeast injection, the animals were again restrained in individual cages for rectal temperature recording, as described previously.

Drug Administration

Nineteen hours after yeast injection, the ethanol extract of *Moringa oleifera* was administered orally at doses of 100, 200 and 300 mg/kg body wt. to three groups of animals, respectively. A similar volume (5 ml/kg body wt.) of 2% aqueous Tween 80 solution was administered orally to the control group. The fifth group of animals received the standard drug, Paracetamol (150 mg/kg body wt.), orally. The rats were restrained for rectal temperature recording at the nineteenth hour, immediately before ethanol extract of *Moringa oleifera* or saline or paracetamol administration, and again at one hour intervals up to the twenty-third hour after yeast injection.

Statistical Analysis

The data were analyzed for significance using the unpaired two-tailed Student's t-test.[7]

RESULTS

The effect of the ethanol extract of *Moringa oleifera* on the normal body temperature in rats is shown in [Table 1]. It was found that ethanol extract of *Moringa oleifera* at doses of 100 mg/kg body wt. caused significant lowering of body temperature up to the fourth hour following its administration. This effect was maximum at doses of 200 and 300 mg/kg body wt., in a dose-dependent manner, and caused significant lowering of body temperature up to the fifth hour after its administration. The subcutaneous injection of yeast suspension markedly elevated the rectal temperature at the nineteenth hour after administration. Treatment with ethanol extract of *Moringa oleifera* at doses of 100, 200 and 300 mg/kg body wt. decreased the rectal temperature of the rats in a dose-dependent manner. The antipyretic effect started as early as the first hour after administration, and the effect was maintained for four hours after its administration. The standard drug paracetamol at the 150 mg/kg body wt. dose significantly reduced the yeast-provoked elevation of body temperature. The results obtained for both the standard drug-treated and ethanol extract of *Moringa oleifera*-treated rats were compared with the control (2% aqueous Tween 80 solution) group and a significant reduction in the yeast-elevated rectal temperature was observed [Table 2].

DISCUSSION

Fever may be a result of infection or one of the sequels of tissue damage, inflammation, graft rejection, or other disease states. Antipyretics are drugs which reduce the elevated body temperature. Regulation of body temperature requires a delicate balance between the population 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 drugs like paracetamol do not influence body temperature

Table 1: Effect of ethanol extract of *Moringa oleifera* Lam on normal body temperature.

Treatment	Rectal temperature (°C) before and after treatment					
	0 h	1 h	2 h	3 h	4 h	5 h
Control 5 ml/kg body wt. of solvent (Tween 80)	37.3±0.2	37.21±0.1	37.38±0.3	37.1±0.2	37.1±0.1	37.0±0.2
Ethanol extract of *Moringa oleifera* 100 mg/kg body wt.	37.2±0.1	36.7±0.3[c]	36.5±0.2[b]	36.5±0.3[b]	36.7±0.2[b]	36.8±0.3
Ethanol extract of *Moringa oleifera* 200 mg/kg body wt.	37.3±0.2	36.2±0.1[a]	36.2±0.2[a]	36.3±0.2[b]	36.7±0.2[b]	36.7±0.2[b]
Ethanol extract of *Moringa oleifera* 300 mg/kg body wt.	37.1±0.1	35.6±0.2[a]	35.8±0.3[a]	35.8±0.1[a]	35.9±0.2[a]	36.0±0.2[b]

Each value represents mean ± SEM (n=6), Control =2% aqueous tween 80 solution. [a]*P*< 0.01, [b]*P*< 0.01, [c]*P*< 0.05, as compared to control values for the corresponding hour.

Table 2: Effect of ethanol extract of *Moringa oleifera* on yeast-induced pyrexia in rats

Treatment	Rectal temperature (°C) after yeast injection at					
	0 h	19 h	20 h	21 h	22 h	23 h
Control 5 ml/kg body wt.of solvent (Tween 80)	37.56±0.02	39.7±0.02	39.49±0.0[3]	39.3±0.07	39.1±0.03	39.05±0.02
Paracetamol 150mg/kgbody wt.	37.7±0.01	39.8±0.03	38.1±0.01[a]	38.0±0.01[a]	37.9±0.05[a]	37.8±0.03[a]
Ethanol extract of *Moringa oleifera* 100 mg/kg body wt.	37.3±0.03	39.8±0.01	39.1±0.01[b]	38.49±0.02[b]	38.3±0.05[b]	37.8±0.09[a]
Ethanol extract of *Moringa oleifera* 200 mg/kg body wt.	37.4±0.01	39.8±0.01	38.8±0.05[a]	38.3±0.05[a]	37.8±0.08[a]	37.7±0.06[a]
Ethanol extract of *Moringa oleifera* 300 mg/kg body wt.	37.5±0.07	39.8±0.07[a]	38.5±0.01[a]	37.8±0.03[a]	37.4±0.02[a]	37.49±0.05[a]

Each value represents mean ± SEM (n=6), Control =2% aqueous tween 80 solution. [a]*P* < 0.01, [b]*P* < 0.01, as compared to control values for the corresponding hour.

when it is elevated by factors such as exercise or increase in ambient temperature.[8] Moringinine and alkaloids are responsible for the effect of the *Moringa oleifera* seeds extract.[9] In the present study the effects of various concentrations of plant extracts and the effects of extracts with that of paracetamol at different times are compared. The present result shows that the ethanolic extract of the seeds of *Moringa oleifera* possesses a significant antipyretic effect in the yeast-provoked elevation of body temperature in rats, and its effect is comparable to that of paracetamol (standard drug). Furthermore, the ethanol extract of *Moringa oleifera* also significantly reduces the normal body temperature, and this is to be studied further for the exact mechanism of action.

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