

# Anti-inflammatory and antipyretic activity of *Aleurites moluccana* leaves

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*Aleurites moluccana* (euphorbiaceae) has been extensively used in folk medicine for the treatment of ulcers, headache, fevers, diarrhea and hypocholesterolemia. Sterols, flavonoids and triterpenes have been isolated from the leaves of the plant. The methanolic extract of dried leaves of *Aleurites moluccana* (AMME) was investigated for anti-inflammatory (carrageenan induced rat paw oedema) and anti-pyretic (brewer's yeast induced pyrexia) activities. Pre-treatment with the extract (100 - 300 mg/kg, p.o.) significantly prevented increase in volume of paw oedema in dose dependent manner. A maximal effect was observed at 300 mg/kg which was comparable to diclofenac (20 mg/kg, orally). Ceiling effect at the dose of 300 mg/kg was observed. The anti-pyretic effect of AMME (measured as % reduction in body temperature) was compared with paracetamol (150 mg/kg, orally). AMME in dose of 300 mg/kg caused significant decrease in body temperature of rats. In conclusion, this study has established the anti-inflammatory activity and antipyretic activity of *Aleurites moluccana* and thus, justifies the ethnic uses of the plant.

**Keywords:** *Aleurites moluccana*, Anti-inflammatory activity, Antipyretic activity, Carrageenan induced rat paw oedema.

## INTRODUCTION

*Aleurites moluccana* commonly known as Candlenut, Indian or Belgaum walnut belongs to family euphorbiaceae (spruce family) grows widely in tropical and sub tropical regions. It is frequently used in folk medicine to treat general weakness due to stomach or bowel disorders in children, bad breath, skin sores, ulcers, fever, headaches, tumors, diarrhea, asthma and helps in rejuvenating the body after poisoning. *Aleurites moluccana* oil makes a strong laxative and is sometimes used like castor oil. The leaves have been used for poultices for deep contusions and swellings [1, 2, 3, 4, 5]. Sterols, flavonoids and triterpenes have been isolated from the leaves of the plant [6]. However, no data were found regarding the pharmacological and phytochemical evaluation of the leaves of the plant. The aim of the present study is to investigate the anti-inflammatory and antipyretic properties of the methanolic extracts of dried leaves of *Aleurites moluccana*.

## MATERIALS AND METHODS

### Plant material

The leaves of *Aleurites moluccana* were collected

from Hoshiarpur, Punjab, India. The plant was identified at PAU, Ludhiana, India.

### Phytochemical screening

Preliminary phytochemical screening revealed the presence of alkaloids, flavonoids, tannins, sterols, amino acids and carbohydrates in the methanolic extract of the leaves of *Aleurites moluccana*.

### Drugs and reagents

Diclofenac (MicroLab, India), Carrageenan (Sigma-Aldrich), Brewer's yeast (Loba Chem, Mumbai) and Paracetamol (GlaxoSmithKline) were used in the study.

### Preparation of extracts

The leaves were washed thoroughly, dried under a shade and pulverized. The coarse powder was extracted with methanol using a soxhlet apparatus to obtain *Aleurites moluccana* methanolic extract (AMME). The extracts were dried using a rotary vacuum evaporator and stored in a desiccator until further use.

## 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 (Hindustan liver, Mumbai, India) and had free access to clean drinking water. The experimental protocol was approved by the Institutional Animal Ethics Committee (IAEC) of SD College, Barnala.

## Anti-inflammatory activity

The anti-inflammatory activity of the extract was determined using carrageenan induced rat paw oedema assay [7]. The rats were divided into five groups of six rats each. The control group received 1% (v/v) DMSO in water p.o. at a dose of 5 ml/kg. The positive control group was treated orally with the standard drug, diclofenac (20 mg/kg). The test groups received the AMEE in doses of 100, 200 and 300 mg/kg p.o.. All the doses were administered 30 min before the induction of oedema by administering 0.1 ml of 1% w/v carrageenan in saline in sub plantar region of hind paw of animal. The degree of paw oedema of all the groups was measured using a plethysmometer (Ugo Basile, Italy) at 30, 60, 120, 180 and 240 min after the administration of carrageenan to each group.

## Antipyretic activity

Antipyretic activity was measured by Brewer's induced pyrexia in rats [8]. Male Wistar rats were fasted overnight with water *ad lib* before the experiments. Pyrexia was induced by subcutaneously injecting 20% w/v brewer's yeast suspension (10 ml/kg) into the animals' dorsum region. Twelve hours after the injection, the rectal temperature of each rat was measured using a digital thermometer (Sato Keiryoki Mfg. Co., Ltd.,

Japan). Only rats that showed an increase in temperature of at least 0.7°C were used for the experiments. AMEE in doses of 100, 200 and 300 mg/kg was administered orally and the temperature was measured at 1, 2, 3 and 5 hr after drug administration. Paracetamol (150 mg/kg p.o.) was used as standard drug.

## Statistical treatment

The results were subjected to two way ANOVA followed by dunnet's test. The data is deemed to be statistically significant if  $p < 0.05$ .

## RESULT

### Effect of the AMEE on carrageenin induced paw edema in rats

The methanolic extract of *Aleurites moluccana* leaves (AMEE) significantly decreased the paw edema induced by carrageenin in rats at the dose of 300 mg/kg comparable to diclofenac (20 mg/kg) shown in Table 1.

### Effect of the AMEE on brewer's yeast-induced pyrexia in rats

There was significant reduction in rectal temperature of rats by AMEE shown in Table 2.

## DISCUSSION

Carrageenan induced paw oedema is a commonly used primary test for the screening of new anti-inflammatory agents and is believed to be biphasic [6]. The first phase (1-2 hr) is due to the release of histamine or serotonin and the second phase of oedema is due to the release of prostaglandin [9, 10]. The results of this study indicate that the methanolic extract of *Aleurites moluccana* significantly reduced carrageenan induced paw oedema

**Table 1. Effect of AMEE on paw oedema induced by carrageenan in rats**

| Treatment  | Dose (mg/kg) | Paw volume (in ml) at various times |            |            |            |            |
|------------|--------------|-------------------------------------|------------|------------|------------|------------|
|            |              | 30 min                              | 60 min     | 120 min    | 180 min    | 240 min    |
| Control    | 5 ml/kg      | 0.28±0.02                           | 0.45±0.06  | 0.68±0.01  | 0.79±0.04  | 0.62±0.02  |
| AMEE       | 100          | 0.25±0.06                           | 0.4±0.05*  | 0.62±0.08* | 0.69±0.07* | 0.54±0.03* |
| AMEE       | 200          | 0.23±0.04                           | 0.32±0.09* | 0.44±0.06* | 0.51±0.03* | 0.41±0.06* |
| AMEE       | 300          | 0.19±0.03*                          | 0.21±0.04* | 0.39±0.09* | 0.41±0.06* | 0.34±0.07* |
| Diclofenac | 20           | 0.18±0.07                           | 0.23±0.05* | 0.35±0.07* | 0.43±0.02* | 0.37±0.05* |

Values are expressed as mean ± S.E.M. (n = 6); \* p < 0.05 vs. control. AMEE- *Aleurites moluccana* methanolic extract

**Table 2. Effect of AMEE on rectal temperature of rats**

| Treatment   | Dose (mg/kg) | % reduction in rectal temperature |             |             |             |             |
|-------------|--------------|-----------------------------------|-------------|-------------|-------------|-------------|
|             |              | 1h                                | 2h          | 3h          | 4h          | 5h          |
| AMEE        | 100          | 19.23±0.32                        | 25.01±0.71  | 36.66±0.53* | 41.21±0.23* | 47.77±0.54* |
| AMEE        | 200          | 25.34±0.20                        | 30.09±0.47* | 43.67±0.50* | 49.22±0.19* | 58.87±0.14* |
| AMEE        | 300          | 28.92±0.72*                       | 37.28±0.88* | 48.65±0.21* | 56.44±0.39* | 67.52±0.75* |
| Paracetamol | 150          | 35.67±0.82*                       | 48.00±0.76  | 57.43±0.62* | 69.87±0.92* | 74.25±0.82* |

Values are expressed as mean ± S.E.M. (n = 6); \* p < 0.05 vs. control. AMEE- *Aleurites moluccana* methanolic extract

in rats. Therefore, the mechanism of action may be by inhibition of histamine, serotonin or prostaglandin synthesis. Usually most anti-inflammatory and analgesic drugs possess antipyretic activity. In general, non-steroidal anti-inflammatory drugs produce their antipyretic action through the inhibition of prostaglandin synthetase within the hypothalamus [11]. Therefore, the antipyretic activity methanolic extract of *Aleurites moluccana* is probably by inhibition of prostaglandin synthesis in hypothalamus. The anti-inflammatory and antipyretic activities of methanolic extract may be due to the presence of alkaloids, sterols and flavonoids.

## CONCLUSION

The results of the present study indicate the anti-inflammatory and antipyretic activities of the leaves of *Aleurites moluccana*. However, further investigation is required to isolate the active constituents responsible for these activities and to elucidate the exact mechanisms of action.

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