

# Evaluation of antipyretic activity of ethanolic extract of plant *Geniosporum prostratum* (L.) Benth. bark

## Abstract

**Background:** The plant *Geniosporum prostratum* (L.) Benth. belongs to the family of "Lamiaceae," which is widely available in Tamil Nadu. Traditionally, plant extract is used to treat fever and common cold for children. The plant has not been yet studied pharmacologically for antipyretic activity. **Aim:** The aim of the present study was to evaluate the antipyretic activity of alcoholic extract of the bark of plant *G. prostratum* (L.) Benth. **Materials and Methods:** A total of 24 healthy white albino rats weighing 200 to 250 g were taken and divided into four groups of six animals each. The initial rectal temperature of each animal was recorded by digital thermometer and its hourly variation was noted for 4 hours. The pyrexia was induced by injecting a suspension of 12% of brewer's yeast (at the dose 1 ml/100 g of animal weight) in normal saline subcutaneously below the nape of neck. Ethanolic extract was given orally to groups II and III at the dose 100 and 200 mg/kg body weight, respectively. **Statistical Analysis:** The results are presented as mean±SEM. Statistical analysis of data was performed using Dunnett's test to study the difference among the mean. **Results:** The difference in temperature between 0 hour and respective time interval was found out by statistical method. The potency of extract to bring down the temperature was compared with that of the control group. The present results showed that ethanolic extract of bark of *G. prostratum* plant possess a significant antipyretic effect in yeast-induced elevation of body temperature in experimental rats. It was revealed that the extract showed dose-dependent antipyretic activity. At a dose of 200 mg/kg, it showed significant antipyretic activity. **Conclusion:** The ethanolic extract of *G. prostratum* (L.) Benth. plant has significant antipyretic activity when compared with the standard drug. So, it can be recommended for further studies.

### Key words:

Brewer's yeast, *Geniosporum prostratum*, gum acacia

## Introduction

Nowadays, it has become essential to screen the plant extract for its efficacy and pharmacological effects.<sup>[1]</sup> The plant *Geniosporum prostratum* (L.) Benth. belonging to family "Lamiaceae" is widely available in Tamil Nadu. This is also known as Bhutulasi. Traditionally, plant extract is used to treat fever and common cold for children; it is also used in ethnomedicinal recipes for respiratory and bronchial diseases.<sup>[2]</sup> Chemical constituents  $\beta$ -sitosterol, ursolic acid, and 5-o-desmethylnoibletin were found on solvent extraction and subsequent column chromatographic

separation.<sup>[3]</sup> Evaluation of herbal drugs involves numerous steps starting from the proper selection and identification of plants, collection, processing, and extraction with different solvents. It also includes preliminary phytochemical studies and evaluation of therapeutic efficacy on suitable animal model and also its acute toxicity and effective dose studies.

Pyrexia or fever is caused as a secondary impact of infection, tissue damage inflammation, graft rejection, malignancy, or other diseased status. It is the body's natural defense to

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create an environment where infectious agents or damaged tissue cannot survive.<sup>[4]</sup>

The antipyretic potential of the *G. prostratum* (L) Benth. bark was studied by Brewer's yeast-induced pyrexia. Thus, pharmacological studies are of much importance and only way for evaluating any herb/drug efficacy. Therefore, considering its importance, we planned stepwise evaluation of antipyretic potential of ethanolic extracts of *G. prostratum*.<sup>[5-7]</sup>

## Materials and Methods

### Material

Dried brewer's yeast was purchased from national chemical Vadodara, Gujarat, and standard drug Paracetamol was taken as gift sample from the RDPL, Jaipur, Rajasthan.

### Plant material collection and preparation of extract

Plant *G. prostratum* (L) Benth. was collected from Orakadam forest near Chennai and was identified and authenticated by Dr. P. Brindha, M.Sc. Ph.D., Dean –Bio sciences in Srimad Andavan Arts and Science College, Tiruchirapalli.

The plant material (Bark) was dried in oven at 40°C and then coarsely powdered. The powdered material was extracted with ethanol by maceration. The extract was dried by rotary vacuum evaporator. The study was carried out with prior ethical approval of Animal Ethics committee, MJRP College of Health care And Allied Sciences, JMGRP University, Jaipur, under Code No. 029/2010/CPCSEA/MJRP.

### Acute oral toxicity study

Acute oral toxicity study was carried out by following Organization for Economic Co-operation and Development guidelines 420-Fixed Dose Procedure. Five animals (Wister Albino rats, 200 - 250 g) were selected for studies. Then, the defined or fixed dose levels of Ethanolic extracts in 100, 200, 500, and 1 000 mg/kg was given orally to identify a dose producing evident toxicity. After giving different doses, the rats were kept under observation for 48 hours. Food was withheld for 3 to 4 hours after drug administration. Furthermore, last highest fixed dose 2 000 mg/kg body

weight was given and again rats were kept under observation to see the sign of toxicity and mortality. Most of the crude extracts possess LD50 value more than 2 000 mg/kg of the body weight of animal used. Dose volume administered was 0.1 ml/100 g body weight of the animal orally. Following was observed: body weights of the rats before and after drug administration, onset of toxicity, and sign of toxicity like change in skin and fur, eyes, and mucous membrane and also respiratory, circulatory, autonomic, and central nervous system and somatomotor activity, behavior pattern, sign of tremors, convulsions, salivation, lethargy, sleep, and coma was also noted if any.<sup>[8]</sup>

### Screening of antipyretic activity

#### Induction of pyrexia

The pyrexia was induced by injecting a suspension of 12% of brewer's yeast in normal saline subcutaneously below the nape of neck in the volume of 1 ml/100 g of animal weight. A stabilized temperature was produced in 18 hours and recorded as shown in Table 1.<sup>[9,10]</sup>

#### Preparation of test extract

Standard drug used for treatment – paracetamol (25 mg/kg) and ethanolic extract of *G. prostratum* bark (100 mg/kg and 200 mg/kg)–were prepared.

#### Treatment schedule

A total of 24 white male albino rats weighing 200 to 250 g were taken and divided into four groups, each consisting six animals ( $n=6$ ).

Group I: Control group, treated only with 5% gum acacia suspension at the dose of 10 ml/kg b.w

Group II: Received ethanolic extract of *G. prostratum* bark, at the dose 100 mg/kg

Group III: Received ethanolic extract of *G. prostratum* bark, at the dose 200 mg/kg

Group IV: Received paracetamol as standard drug at the dose 25 mg/kg

Treatment was continued for next four hours after inducing pyrexia. Temperature was measured after interval of one hour up to 4 hours.

**Table 1: Antipyretic activity of ethanolic extracts of *Geniosporum prostratum* (L) Benth**

Treatment	Dose mg/kg	Normal rectal temperature °C mean±S.E	Temperature 18 hrs after yeast-induced pyrexia	Temperature in °C after treatments (hours)				% Activity
				1 <sup>st</sup> Hour	2 <sup>nd</sup> Hour	3 <sup>rd</sup> Hour	4 <sup>th</sup> Hour	
Control	10 ml/kg b.w	37.2±0.05	39.09±0.24	38.6±0.05	38.7±0.07	38.7±0.04	38.7±0.06	0.9
5% Gum acacia								
The ethanolic extract	100 mg/kg b.w	37.3±0.09	39.08±0.34	38.6±0.24	38.8±0.12	38.5±0.09	38.51±0.06	1.40
The ethanolic extract	200 mg/kg b.w	37.6±0.13	39.06±0.72	38.8±0.41	38.5±0.20	38.01±0.15	37.8±0.21**	3.20
Paracetamol	25 mg/kg b.w	37.3±0.28	39.10±0.16	38.5±0.28	37.9±0.34	37.9±0.26	37.6**±0.17	3.80

$n=6$  values as mean±S.E; \* $P<0.01$  vs control by Dunnett's test; \*\* $P<0.001$

### Experimental procedure

Male albino rat weighing 200 to 250 g were injected subcutaneously (5 ml/kg) aqueous suspension of dried Brewer's Yeast (12%). Rats developing 1°C or more rises in rectal temperature at 18<sup>th</sup> hour after injection were treated with 5% gum acacia<sup>[5]</sup> and served as control. Group II and III received the ethanolic extract (100 and 200 mg/kg, respectively). Group IV was treated with paracetamol<sup>[11,12]</sup> (25 mg/kg) and served as reference standard. Temperature was recorded at time intervals of 1, 2, 3, and 4 hours.

### Statistical analysis

The results are presented as mean±SEM. Statistical analysis of data was performed using Dunnett's test to study the difference among the mean.

### Results

The ethanolic extract of bark of *G. prostratum* (L) Benth. belonging to family Lamiaceae has been investigated for its antipyretic efficacy in a systematic way covering acute toxicity activity to rationalize its use as drug of therapeutic importance.

### Extraction

The yield of the ethanolic extract was found to be 1.80% w/w.

### Acute oral toxicity study

In Acute Oral Toxicity Study, no mortality was found at the end of study and sign of toxicity like change in skin and fur, eyes and mucous membrane, and also respiratory, circulatory, autonomic, and central nervous system and somatomotor activity, behavior pattern, sign of tremors, convulsions, salivation, lethargy, sleep, coma were also not found.

### Antipyretic activity

The effect of ethanolic extract of bark of *G. prostratum* (L) Benth. on yeast-induced pyrexia has been shown in Table 1. Treatment with extracts at dose of 100 and 200 mg/kg body weight and paracetamol at dose of 25 mg/kg decreased the body temperature of yeast-induced rats. The results obtained from both standard- and extract-treated groups were compared with the control group. A significant reduction in the yeast-elevated rectal temperature was observed in the test drug. Percentage decrease in temperature by ethanolic extract of *G. prostratum* bark (100 and 200 mg/kg) and standard drug was found to be 1.40, 3.20, and 3.80 percentages, respectively.

### Discussion

Regulation of body temperature requires a delicate balance between production and loss of heat and the hypothalamus regulates that set point at which body temperature is maintained. It is well established that fever is mediated by

release of prostaglandins in hypothalamus, which results in increased heat production and decreased heat loss leading to pyrexia.

The plant *G. prostratum* (L) Benth. belonging to family "Lamiaceae" is widely available in Tamil Nadu. Traditionally, plant extract is used to treat fever and common cold for children. The plant has not been yet studied pharmacologically toward its antipyretic activity.

The plant *G. prostratum* (L) Benth. has been examined to gain an insight of its pharmacological behavior. These studies enable the identification of the plant material for future investigation and form an important aspect of drug studies.

The present study indicates that *G. prostratum* (L) Benth. could play an important role in the management of fever. As the human being thinks of such drug which are safe, economic having low cost of production, wide distribution, and easily available. We may conclude that the ethanolic extract of bark of *G. prostratum* (L) Benth. could be useful and safe if we will use it as antipyretic. Further study is in progress to isolate and characterize the active principle responsible for the activity.

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