

# Antipyretic activity of *Pterolobium hexapetalum* (Roth.) Sant. and Wagh. Stem bark extracts

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## ABSTRACT

*Pterolobium hexapetalum* (Caesalpinaceae) is one of the important herbal medicines against chest pain, fever, cough, tooth ache, dog bite, diarrhea, ulcer, jaundice, skin disorders, constipation, piles, and venereal diseases. Furthermore, possess high quantities of phytoconstituents in leaf, stem bark, flower, and fruit extracts such as flavonoids, alkaloids, phenols, glycosides, saponins steroids, tannins, and quinines. *P. hexapetalum* extracts also proved as effective antimicrobial, antiulcerous, antidiarrheal, and antioxidant herbal drug through *in vitro* and *in vivo* studies. *P. hexapetalum* stem bark extracts have been evaluated for their antipyretic activity against yeast-induced pyrexia in rats. The methanol, as well as water extracts of the stem bark, showed potential antipyretic activity. It was observed that methanol extract at a dose of 400 mg/kg body weight significantly elevated body temperature of rabbit showed maximum antipyretic activity than water extract. The effect produced was comparable with the standard antipyretic drug *paracetamol*. Hence, the present investigation reveals the antipyretic activities of the methanolic and water extracts of the stem bark extracts of *P. hexapetalum*.

**Keywords:** Antipyretic, albino rats, *Pterolobium hexapetalum*, *Paracetamol*, yeast

## Introduction

Pyrexia or fever is defined as an elevation of body temperature. It is a response due to tissue damage, inflammation, malignancy, or graft rejection.<sup>[1]</sup> Fever is associated with symptoms of sickness behavior which consist of lethargy, depression, anorexia, sleepiness, and inability to concentrate. Antipyretic medication can be effective at lowering the temperature which may include the affected people's comfort.<sup>[2]</sup> Plants have been a major source for new drug design. Traditional use of medicinal plants with antipyretic activity is a common worldwide feature of many ethnobotanical cultural systems. In ethnobotany, plants with naturally occurring antipyretic activity are commonly referred as febrifuges.<sup>[3,4]</sup>

*Pterolobium hexapetalum* (Roth.) Sant. and Wagh ("Yerra checki") is an extensive, armed straggling spiny shrub, and herbal medicine used by the chenchu tribes of Nallamala forest region of Mahanandi hills. *P. hexapetalum* leaf and fruit paste are used to cure diarrhea, constipation, and piles.<sup>[5,6]</sup> Leaf, stem bark, flower, and fruit extracts resulted high quantities of alkaloids, flavonoids, phenols, glycosides, tannins, quinones, and steroids. Moreover, also proved as effective antifungal against *Aspergillus niger* and *Candida albicans* at 10 mg/well, with minimum inhibitory concentration (MIC) values 0.625 and 1.25 mg, respectively.<sup>[7]</sup> Furthermore, reported as effective antibacterial against four pathogenic bacterial strains with MIC values ranges from 0.312 to 1.25 mg.<sup>[8]</sup> Hence, the *P. hexapetalum* stem bark methanol and aqueous extracts pyloric effects in yeast-induced pyrexia albino Wister rats at 200 and 400 mg/kg b.wt were tested to prove its efficacy more scientifically to that of the traditional herbal use.

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## Materials and Methods

### Objectives

The stem bark methanol and aqueous crude extracts have to subject for toxicity studies. Antipyretic activity by yeast-induced pyrexia was carried out.

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## Collection and identification of the plant material

The stem bark was collected from Nallamalla forest of Mahanandi, Kurnool, Andhra Pradesh. The taxonomic identification of the plant was confirmed by Yasodamma, Department of Botany, Sri Venkateshwara University, Tirupati, and Andhra Pradesh, India.

## Preparation of the crude extracts

Fresh stem bark was washed shade dried, powdered, and 70 g each were soaked and extracted with water after 72 h the filtrate was dried on water bath. The dried powders each 40 g were extracted in a Soxhlet apparatus using 200 ml of solvent methanol. The filtrates were concentrated on Rotavapor and dried. All extracts were stored at 40°C in refrigerator until further use.

## Animal selection

Wister albino rats of both sexes of either weighing about 150–200 g were employed for this study. The animals were acclimatized to standard laboratory conditions (temperature 25°C ± 2°C) and maintained on 12 h light; and 12 h dark cycle. They were fed with *ad libitum*. The experimental protocol was approved by the institutional animal ethical committee in the Resolution No. 12/2011–2012/, (i) 438/01a/CPCSEA/IAEC/SVU/NY-BK/dt: 19/11/2011.

## Acute toxicity study

It was carried out as per the 423 guidelines set by the organization for economic cooperation and development). Albino rats ( $n = 10$ ) of either sex selected by random sampling technique were used for the study. The aqueous and methanol extracts were administered at the dose levels of 500, 1000, 1500, 2000, 2500, 3000, and 3500 mg/kg body weight by oral gavage and observed for 14 days.

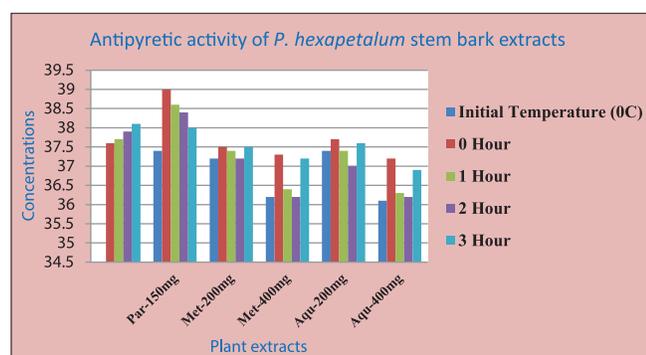


Figure 1: Antipyretic activity of *P. hexapetalum* stem bark extracts

## Antipyretic test

Yeast-induced pyrexia method. The albino rats were randomly distributed in control and test groups of six animals each. They were fed with standard laboratory diet *ad libitum* and allowed free access to drinking water.<sup>[9]</sup> The animals were kept in 12/12 h dark-light cycle. Fever was induced in rats by subcutaneous injection of 20% w/v of brewer's yeast suspension (10 ml/kg) into animal's dorsum region. 19 h after yeast injection, the rectal temperature of each rat was measured using a thermometer. Only rats that showed an increase in temperature of at least 0.7°C were employed for the experiments. The methanol and water extracts (200 and 400 mg/kg) or 10% v/v propylene glycol solution (10 ml/kg) was administered orally and the temperature was measured at 0, 1, 2, and 3 h after drug administration.

## Statistical significance

All the data are expressed as mean ± standard error mean. The values obtained for the above parameters with the extracts were compared with control group using one-way ANOVA followed by Dunnett's test. The values of  $P < 0.05$  and  $P < 0.01$  were considered to indicate a significant difference between the groups.

## Results

### Acute toxicity study (LD50)

Stem bark aqueous and methanol extracts were studied for acute toxicity at different doses of 500, 1000, 1500, 2000, 2500, 3000, and 3500 mg/kg b.wt. and observed for 14 days. The extracts found devoid of mortality of the animals, in addition, no toxic symptoms were observed also food and water intake was not affected during the study. Hence, these extracts did not show any significant toxicity on Wister albino rats. Hence, 3500 mg/kg was considered as lethal dose 50 cutoff value. Hence, the doses selected for the experiment as per organization for economic cooperation and development guidelines 423 and fixed up to a maximum of 140 mg/kg (1/25<sup>th</sup> of 3500 mg/kg).

### Antipyretic activity

Paracetamol is a common antipyretic agent, which is safe in therapeutic doses and analgesic compound available for many years for oral administration since intravenous infusion was hampered by water insolubility. Experimental results exhibited that both the extracts at a dose of 400 mg/kg body weight showed maximum activity and to maintain a normal body temperature and reduce yeast-induced elevated

Table 1: Antipyretic effect of *P. hexapetalum* stem bark extracts in albino rats

Treatment/dose (mg/kg)	Initial temperature (°C)	Average rectal temperature °C in h±SEM			
		0 h	1 h	2 h	3 h
Control	37.50±0.25	37.60±0.16	37.70±0.12	37.90±0.14	38.10±0.24
Paracetamol-150 mg	37.48±0.20	39.10±0.24	38.60±0.66	38.48±0.40	38.0±0.46**
Methanol-200 mg	37.20±0.24	37.54±0.92**	37.40±0.70*	37.22±0.48	37.20±1.77
Methanol-400 mg	36.20±0.05	37.37±0.29	36.40±1.95	36.20±1.77	37.52±0.70*
Aqueous-200 mg	37.40±0.40	37.77±1.46	37.42±0.70*	37.00±0.25	37.63±0.76
Aqueous-400 mg	36.10±0.05	37.20±0.66	36.40±1.95	36.22±1.77	36.90±0.14

All the data are expressed as mean±SEM,  $n=6$ , \* $P < 0.05$  and \*\* $P < 0.01$  when compared with control group one-way ANOVA followed by Dunnett's test. SEM: Standard error mean

rectal temp in rat and their effects are comparable to that of standard antipyretic drug. The results indicated that highest antipyretic activity of methanol extract when compared to that aqueous extract (Figure 1).

## Discussion

The acute toxicity study, antipyretic properties of *P. hexapetalum* methanol, and water extracts were investigated in the present study. It was found to be safe and no mortality was observed to a dose as high as 3500 mg/kg. The acute toxicity result reveals that this plant might be considered as a broad non-toxic one. Nowadays, traditional plants are the main sources for isolation of potent drugs. It was found that the stem bark extracts of *P. hexapetalum* having the antipyretic effect. It reveals that methanol extract at a dose of 400 mg/kg body weight showed maximum antipyretic activity. It maintaining normal body temperature and reducing boiled milk-induced elevated rectal temperature in rats and their effects are comparable to that of standard antipyretic drug *paracetamol*. Antipyretic activity is commonly mentioned as a characteristic of drugs or compounds which have an inhibitory effect on prostaglandin biosynthesis.<sup>[10]</sup> The antipyretic activity may be due to the presence of phytochemicals such as saponins, flavonoids, glycosides, alkaloids, and anthraquinones have been reported to exhibited acute and antipyretic activity in rats.<sup>[11-13]</sup> The present study, therefore, supports the claims of traditional medicine practitioners as an antipyretic remedy.

In conclusion, this study provides evidence for the antipyretic activity of *P. hexapetalum* which could partly contribute to its ethnomedical use. However, further, the investigation is required to isolate the bioactive constituents responsible for these activities and to elucidate the exact mechanisms of action.

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