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Original Article

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

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ABSTRACT

Pterolobium hexapetalum (Caesalpiniaceae) is one of the important herbal medicines against chest pain, fever, cough, tooth ache, dog bite, diarrhoea, ulcer, jaundice, skin disorders, constipation, piles and venereal diseases. Also possess high quantities of phytoconstituents in leaf, stem bark, flower and fruit extracts like flavonoides, alkaloids, phenols, glycosides, saponins steroids, tannins and quinines. P. hexapetalum extracts also proved as effective antimicrobial, antiulcerous, antidiarrhoel 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 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[1]. Fever is associated with symptoms of sickness behaviour which consist of lethargy, depression, anorexia, sleepiness & inability to concentrate. Antipyretic medication can be effective at lowering the temperature which may include the affected people's comfort[2]. 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 ethno botanical cultural systems. In ethno botany, plants with naturally occurring antipyretic activity are commonly referred as febrifuges[3,4].

Pterolobium hexapetalum (Roth.) Sant. and Wagh. ("Yerra checki") is an extensive, armed straggling spiny shrub and herbal medicine used by the chenchu tribes of Nallamalai forest region of Mahanandi hills. *P. hexapetalum* leaf and fruit paste is used to cure diarrhoea, constipation and piles[5,6]. Leaf, stem bark, flower and fruit extracts resulted high quantities of alkaloids, flavonoids, phenols, glycosides, tannins, quinones and steroids. And also proved as effective antifungal against *Aspergillus niger* and *Candida albicans* at 10 mg/well, with MIC values 0.625 and 1.25 mg respectively[7]. Also reported as effective antibacterial against four pathogenic bacterial strains with MIC values ranges from 0.312-1.25 mg[8]. 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.

Materials & Methods

Objectives:

The stem bark methanol & aqueous crude extracts has 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, AP. The taxonomic identification of the plant was confirmed by Prof. N. Yasodamma, Department of Botany, Sri Venkateshwara University, Tirupathi, 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 hrs 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 rotavapour and dried. All extracts were stored at 40C 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±2oC) and maintained on 12 hours light; and 12 hours dark cycle. They were fed with ad libitum. The experimental protocol was approved by 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 OEC (Organisation for economic co-operation 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.

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[9]. The animals were kept in 12/12 hours dark-light cycle. Fever was induced in rats by subcutaneous injection of 20% w/v of brewer's yeast suspension (10 ml/kg) in to animal's dorsum region. The rectal temperature of each rat was measured through making use of a thermometer, 19 hours after yeast injection. The inclusion criterion was the rats that showing an increase in temperature of at least 0.7 °C. 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 hours after drug administration.

Statistical significance

All the data are expressed as mean ± SEM. Comparison of the obtained values for the above parameters and the extracts with control group, was done through making use of 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 period. So these extracts did not show any significant toxicity on Wister albino rats. Hence 3500 mg/kg was considered as LD50 cut off value. So the doses selected for experiment as per OECD guidelines 423 and fixed up to a maximum of 140 mg/kg (1/25th 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 shampered by water insolubility. Experimental results exhibited that maximum activity was demonstrated by both extracts at a dose of 400 mg/kg body weight and they maintain a normal body temperature and reduce yeast induced elevated rectal temp in rats and their effect is comparable to that of standard antipyretic drug. The results indicated the highest antipyretic activity of methanol extract when compared to that of aqueous extract.

Table: 1: Antipyretic effect of Pterolobium hexapetalum stem bark extracts in albino rats

Treatment /Dose (mg/kg)	Initial Temperature (0C)	Average Rectal Temperature oC in hour ± SEM			
		0 Hour	1 Hour	2 Hour	3 Hour
Control	37.50 ± 0.25	37.60 ± 0.16	37.70 ± 0.12	37.90 ± 0.14	38.10 ± 0.24
Paracetemol -150mg	37.48 ±0.20	39.10 ± 0.24	38.60 ± 0.66	38.48 ± 0.40	38.0 ± 0.46**
Methanol - 200mg	37.20 ± 0.24	37.54 ± 0.92**	37.40 ± 0.70*	37.22 ± 0.48	37.20 ± 1.77
Methanol - 400mg	36.20 ± 0.05	37.37 ± 0.29	36.40 ± 1.95	36.20 ±1.77	37.52 ± 0.70*
Aqueous - 200mg	37.40 ± 0.40	37.77 ±1.46	37.42 ± 0.70*	37.00 ± 0.25	37.63 ± 0.76
Aqueous - 400mg	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.

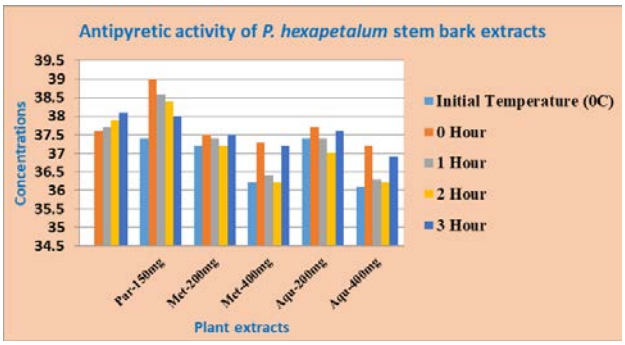

Figure 1. Antipyretic activity of p.Hexapetalum stem bark extracts

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. Now day's 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. They maintain normal body temperature and reduce boiled milk induced elevated rectal temperature in rats and their effect is comparable to that of standard antipyretic drug *paracetamal*. Antipyretic activity is commonly mentioned as a characteristic of drugs or compounds which have an inhibitory effect on prostaglandin-biosynthesis[10]. 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[11,12,13]. Therefore, the claims of traditional medicine practitioners as an antipyretic remedy are supported by the present study.

In conclusion, the evidences for the antipyretic activity of *P. hexapetalum* having the capacity of partial contribution to its ethno medical use, are hereby presented. However, further studies are suggested aimed at isolating the bioactive constituents responsible for these activities and elucidating the exact mechanisms of action.

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