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EVALUATION OF ANTIPYRETIC ACTIVITY OF METHANOLIC EXTRACT OF *EUPHORBIA CYATHOPHORA*

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ABSTRACT

The present study was designed to investigate the anti-pyretic activity of methanol extract of *Euphorbia cyathophora* (MEEC) bark in experimental models. Subcutaneous injection of 20% aqueous suspension of Brewer's yeast in wistar rats leads tom pyrexia. Intraperitoneal administration of MEEC at the dose of 100 and 200 mg/kg were shown dose dependent decrease in body temperature in brewer's yeast induced hyperthermia in rats. MEEC significantly decrease in body temperature ($p<0.05$) at 200 mg/kg when compared to control. These findings suggest that the ethanol extract of *Euphorbia cyathophora* (MEEC) possessed good antipyretic activity. Preliminary phytochemical screening of the extract showed the presence of carbohydrates, triterpenoids, tannins, flavonoids, anthocyanins, steroids and glycosides which may be responsible for antipyretic activity.

Key words: *Euphorbia cyathophora*, Brewer's yeast, Anti-pyretic, Paracetamol.

INTRODUCTION

Euphorbia cyathophora (Euphorbiaceae) is tree 60-90 height, bark smooth, height, soft. Ethnobotanical literature indicates that the aerial part of *Euphorbia cyathophora* widely used in fever, jaundice, wound healing, aphrodisiac and mouth sores. Therefore, the present study was aimed to evaluate the antipyretic activity of the methanolic extract of *Euphorbia cyathophora.* Pyrexia or fever is caused as a secondary impact of infection, tissue damage, inflammation, graft rejection, malignancy or other diseased states. It is the body's natural defence to create an environment where infectious agent or damaged tissue cannot survive. Normally the infected or damaged tissue initiates the enhanced formation of pro-inflammatory mediator's (cytokines like interleukin 1B, a, B and TNF-a), which increase the synthesis of prostaglandin E2 (PGE2) near preoptic hypothalamus area and thereby triggering the hypothalamus to elevate the body temperature. As the temperature regulatory system is governed by a nervous feedback mechanism, so when body temperature becomes very high, it dilate the blood vessels and increase sweating to reduce the temperature; but when the body temperature becomes very low hypothalamus protect the internal temperature by vasoconstriction. High fever often increases faster disease progression by increasing tissue catabolism, dehydration, and existing complaints, as found in HIV, when fever during seroconversion results faster disease progression. Most of the antipyretic drugs inhibit COX-2 expression to reduce the elevated body temperature by inhibiting PGE2 biosynthesis. Moreover, these synthetic agents irreversity inhibit COX-2 with high selectivity but are toxic to the hepatic cells, glomeruli, cortex of brain and heart muscles, whereas natural COX-2 inhibitors have lower selectivity with fewer side effects (Ghosh MN, 2005). A Natural antipyretic agent with reduced or no toxicity is therefore became essential. As *Euphorbia cyathophora* is a century old medicament used in ailments that cause fever, it will be a cost of effective alternative approach to evaluate the antipyretic activity of this plant.

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MATERIALS AND METHODS

Plant Materials

The plant *Euphorbia cyathophora* (Family: (Euphorbiaceae) was collected from Kolli Hills at Namakkal District, Tamilnadu, India The aerial parts of the plants were collected and dried in shade and powdered to obtain coarse powder. The coarse powder material (250 g) was extracted with ethanol (95% v/v) by using soxhlet apparatus. The ethanol extract was concentrated in *vacuo* and kept in a vacuum desiccator for complete removal of solvent. The yield was 8.35% w/w with respect to dried powder. The extract was subjected to preliminary qualitative tests to identify the various phytoconstituents present. It was observed that methanolic extract contained carbohydrates, terpenoids, tannins, flavonoids, steroids and glycosides.

Animals

Adult Wistar albino rats of either sex. Weighing between 180-200 g was used for the study. They were procured from Perundurai Medical College, Perundurai, Tamilnadu. They were grouped in to four, each consisting of six rats. All the animals were housed in animal house of the institution in polypropylene cages maintained under standard conditions (12 h night/ 12 h dark cycle: 25±2ºC, 35-60% humidity) and were handled in conformation with ethical guidelines. Prior permission was obtained from the Institutional Animal Ethical Committee as per the guidelines.

Evaluation of Antipyretic Activity

The antipyretic activity was evaluated using Brewer's yeast-induced pyrexia in rats. Wistar albino rats were selected, weighted and divided into four groups of six animals each. All these animals were fasted 18 h prior to commencement of experiment but water was provided. Fever was induced by injection 20 ml/kg (s.c.) of 20% aqueous suspension of Brewer's yeast in normal saline below the nape of the neck and rectal temperature was recorded by the clinical thermometer immediately before (-18 h) and 18 h after (0 h) Brewer's yeast injection. Prior to the experiment, the rats were maintained in separate cages for 7 d and the animals with approximately constant rectal temperature were selected for the study. Paracetamol (100 mg/kg, p.o.) was used as standard drug for comparing the antipyretic action of extract. The extract at the doses of 100 and 200 mg/kg was administered intraperitoneally (i.p.) one group was administered with Paracetamol (100mg/kg) i.p. control group was given 0.5 ml normal saline. The rectal temperature was measured at 1, 2 and 3 h after drug administration by using digital thermometer. Percentage reduction in rectal temperature was calculated by considering the total fall in temperature to normal level (Hullatti KK and Sharada MS, 2007; Devi K. Jyotsna and Swetha K, 2013).

Table 1. Effect of methanolic extract of *Euphorbia cyathophora* (MECM) on yeast induced pyrexia in rats

Treatment	Dose mg/kg	Rectal temperature ^{0}C		Rectal temperature after administration of drug ^{0}C		
		Normal (A)	18h after yeast administration (B)	1h(C_1)	2h(C_2)	3h(C_3)
Control (saline)	0.5ml	36.95±1.15	39.12±1.14	38.75±1.12	38.62±1.22	38.25±1.24
Paracetamol	100	36.97±0.18	39.16±1.16	38.07±1.14	37.27±1.15	37.05±0.86
MECM	100	37.14±1.14	39.22±1.17	38.68±1.06	38.12±1.11	37.62±0.68
MECM	200	36.86±1.13	39.32±1.12	38.25±0.86	37.78±1.15	37.14±1.58

All the values are expressed as mean (n=6), $p<0.01$, Experimental animals compared with control.

Statistical analysis

The results are presented as mean ± SEM. Statistical analysis of data was performed using students 't' test to study the differences amongst the means.

RESULT

The results of effect of methanolic extract of *Euphorbia cyathophora* yeast-induced pyrexia in rats are depicted in Table 1. *Euphorbia cyathophora* produced significant ($P< 0.01$) antipyretic effect in a dose dependent manner. Normal rats did not show any decrease in the body temperature on intraperitoneal administration of *Euphorbia cyathophora.* The initial and final rectal temperature (^{0}C) for two groups of extract administered rats was 39.22±1.17 and 37.62±0.68 (100 mg/kg); 39.32±1.12 and 37.14±1.58 (200 mg/kg). Based on the result, it can be concluded the extract of *Euphorbia cyathophora* produced antipyretic effect.

DISCUSSION

Fever may be result of infection or one of the sequelae of tissue damage, inflammation, graft rejection or other disease states. Antipyretics are drugs which reduced elevated body temperature. Regulation of body temperature requires a delicate balance between the production and loss of heat, and the hypothalamus regulates the set point at which body temperature is maintained (Kulkarni SK, 1999; Lakshman K *et al*., 2006). In fever this set point is elevated and drugs like Paracetamol do not influence body temperature when it is

elevated by factors such as exercise or increases in ambient temperature. The present result show that alcoholic extract of *Euphorbia cyathophora* possess a significant antipyretic effect in yeast- provoked elevation of body temperature in rats, and its effect is comparable to that of Paracetamol (Elumalai *et al*., 2013; Mutalik S *et al*., 2003). Furthermore the MEECs also significantly reduced the body temperature, and this is to be studied for further exact mechanism of action.

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