



ANTIPYRETIC ACTIVITY OF METHANOL EXTRACT OF *Sorghum vulgare* L. LEAVES ON BREWER'S YEAST INDUCED PYREXIA IN WISTAR RATS

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ABSTRACT

The present pharmacological investigation was undertaken to study the anti-pyretic activity of methanol extract of leaves of *Sorghum vulgare* L. (Family: Poaceae) in albino rats against yeast induced pyrexia. Four groups of six animals were used for the experiment. The yeast induced pyrexia method was standardized first by injecting 15% yeast suspension (s.c) followed by recording the rectal temperature at regular intervals. Then the evaluation of anti-pyretic activity of methanol extract of leaves of *Sorghum vulgare* L. (200mg/kg & 400mg/kg) was carried out by using this standard procedure. The extract of *Sorghum vulgare* L. plant showed a significant ($P < 0.01$) dose dependent antipyretic effect in yeast induced elevation of body temperature in experimental rats. The data generated during study shows that *Sorghum vulgare* L. having significant anti-pyretic activity.

Key words: *Sorghum vulgare* L., Brewer's yeast, Antipyretic activity.

INTRODUCTION

In recent years herbal medicine is a major component in all traditional medicine systems, and a common element in Siddha, Ayurvedic, Homeopathic, Naturopathic, Traditional Chinese medicine, and Native American medicine. Considerable efforts have been directed towards the development of natural products from various plant sources (Hazeena Begum V and Velavan S, 2011).

The plant *Sorghum vulgare* L., known as Millet or Guinea Corn. Sorghum is generally classified under two varieties, saccharine and non-saccharine. The saccharine sorghums are not used for producing sugar owing to the difficulty of crystallization. The plant *Sorghum vulgare* L., (cv. Cholan), a grass species is widely cultivated for its edible grains across northern part of Tamil Nadu. It can grow in prolonged drought hit and

arid soils with more root-to-leaf area. It belongs to Poaceae family. On the basis of the traditional use of the plant for treating convulsion, but no previous pharmacological (or) clinical study was carried out to test the antipyretic activity of this plant (Bulusu Sitaram & Chuneekar KC, 2006). Since the antipyretic activity effect of *Sorghum vulgare* L. has been experimentally not confirmed. So the present study has been carried out to evaluate and compare the in vivo antipyretic activity of the methanol of leaves of *Sorghum vulgare* L. extract by yeast induced pyrexia method.

MATERIALS AND METHODS

Plant collection

The Plant material of *Sorghum vulgare* L. used for investigation was collected from Tirunelveli District, in the Month of August 2014. The plant was authenticated by Dr.V.Chelladurai, Research Officer Botany, C.C.R.A.S., Govt. of India. The voucher specimen of the plant was deposited at the college for further reference.

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Preparation of extracts

The leaves of *Sorghum vulgare* L. was dried in shade, separated and made to dry powder. It was then passed through the 40 mesh sieve. A weighed quantity (100gm) of the powder was subjected to continuous hot extraction in Soxhlet Apparatus. The extract was evaporated under reduced pressure using rotary evaporator until all the solvent has been removed to give an extract sample. Percentage yield of methanolic extract of *Sorghum vulgare* L. was found to be 11.5 % w/w.

Preliminary phytochemical screening

The phytochemical examination of methanol extract of leaves of *Sorghum vulgare* L. was performed by the standard methods (Harbone JP, 1973).

Experimental Animals

Wister albino rats weighing between 180-250gm each maintained in a 12 h light/dark cycle at a constant temperature 25 °C with free access to feed (Sai durga feeds and foods, Bangalore) and water. All animals were fasted prior to all assays and were allocated to different experimental groups each of 6 rats. Moreover the animals were kept in specially constructed cages to prevent coprophagia during the experiment. All experiments were carried out according to the guidelines for care and use of experimental animals and approved by Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA). Ethical committee clearance was obtained from IAEC (Institutional Animal Ethics Committee) of CPCSEA.

Acute toxicity study

Acute toxicity study of methanol extract of *Sorghum vulgare* L. was determined by acute toxic class method of OECD guidelines. In acute oral toxicity study mortality was not observed up to 2000mg/kg body weight (OECD, 2002).

Antipyretic studies (Brewer's yeast induced hyperpyrexia method)

Animals of either sex were divided in to four groups containing six in each group for this experiment. The normal body temperature of each rat was measure rectally at one hour interval on a thermometer and recorded. The antipyretic activities of extract were evaluated using Brewer's yeast induced pyrexia in Wistar rats [3]. Before yeast injection the basal rectal temperature of rats was recorded and after recording animals were given subcutaneous injection of 10 ml/ kg of 15 % w/v yeast suspended in 0.5 % w/v methyl cellulose solution for elevation of body temperature of rats. Rats were then returned to their housing cages. At the 18hrs after yeast injection, the vehicle, standard drug and test drugs were administered in to different groups.

Propylene glycol at dose of 5 ml/kg was administered orally to the control groups of animals and Paracetamol at dose of 150mg/kg was administered orally to standard group of animals. The methanol extract of *Sorghum vulgare* L. leaves was administered orally at a dose of 200 mg/kg and 400 mg / kg of body weight to two groups of animals respectively. Rectal temperature was recorded by clinical thermometer at 0, 1, 2 3rd hrs after drug administration and tabulated in table 1 (Vogel HG, 2002).

Statistical analysis

Data was expressed as mean \pm Standard Error of Mean. . The results were analyzed statistically by ANOVA is followed by Dunnet's test. The result of experiments by proper statistical analysis as stated above is tabulated in table 1.

RESULTS

Preliminary phytochemical screening

The results of preliminary phytochemical screening of the methanol extract of leaves of *Sorghum vulgare* L. revealed that presence of alkaloids, flavonoids, glycosides, tannins, saponins, terpenoids and absence of steroids.

Anti-pyretic activity

The effect of methanol extract of *Sorghum vulgare* L. plant on yeast induced pyrexia has been shown in table 1. Treatment with extracts at dose of 200 mg/kg and 400 mg/kg body weight and Paracetamol at dose of, 150mg/kg decreased body temperature of yeast induced rats. The results obtained from both standards and extracts treated groups were compared with the control group. A significant reduction in the yeast elevated rectal temperature was observed in the test drug.

DISCUSSION

Fever can be induced in experimental animals by intravenous or subcutaneous injection of pyrogens. To evaluate the antipyretic activity of test drugs, the most commonly employed method to induce fever involves injection of lipopolysaccharides (LPS) or brewer's yeast in rabbits or rats. Antipyretic are the agents, which reduce the elevated body temperature. Regulation of body temperature requires a delicate balance between production and loss of heat, and the hypothalamus regulates the set point at which body temperature is maintained. In fever this set point elevates and a drug like paracetamol does not influence body temperature when it is elevated by the factors such as exercise or increase in ambient temperature (Mwonjoria JK *et al.*, 2011; Howard M, 1993). Yeast induced fever is called pathogenic fever. Its etiology includes production of prostaglandins, which set the thermoregulatory center at a lower temperature. The present results show that MESV possesses a

significant antipyretic effect in yeast- provoked elevation of body temperature in rats, and its effect is comparable to that of paracetamol (standard drug). So inhibition of prostaglandin synthesis could be the possible mechanism of antipyretic action as that of paracetamol. Also, there

are several mediators or multiprocesses underlining the pathogenesis of fever. Inhibition of any of these mediators may bring about antipyretic effect (Chandrashekar NV, 2002; Akio M *et al.*, 1988).

Table 1. Antipyretic effect of methanol extract of leaves of *Sorghum vulgare L.* on wistar albino rats

S.No	Group	Treatment	Dose	Initial Rectal Temp. in 0C before Yeast Injection	Rectal Temperature in °C after 18hrs of Yeast Injection (Mean± SEM)			
					0hr	1hr	2hr	3hr
1	I	Control	5ml/kg	37.52 ± 0.12	40.22 ± 0.12	41.29 ± 0.14	41.52 ± 0.12	40.67 ± 0.10
2	II	Standard paracetamol	150mg/kg	37.33 ± 0.1	40.05 ± 0.12	38.17 ± 0.14	38.14±0.12*	37.12 ± 0.17*
3	III	MESV	200mg/kg	37.17 ± 0.1	40.12 ± 0.14	39.94± 0.12	39.64 ± 0.16	38.29 ± 0.23
4	IV	MESV	400mg/kg	37.12 ± 0.2	40.15± 0.12	39.52 ± 0.12	38.22±0.14*	37.24 ± 0.12*

CONCLUSION

The present investigation it may be concluded that the methanol extract of *Sorghum vulgare L.* leaves have antipyretic activity. In this study no attempt was made to ascertain the mechanism of the observed antipyretic activity. However, it can be suggested that it

may be acting through either the peripheral or central mechanism enumerated above. It is also possible that both the mechanisms may be involved. Further, study regarding isolation and characterization of active principle responsible for antipyretic activity are under planning in our laboratory.

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