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Study on Antipyretic Activity of *Hibiscus rosa sinensis* Leaves in Yeast Induced Pyrexia

	
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ABSTRACT

Herbal drugs are being proved as effective as synthetic drugs with lesser side effects. Herbal Medicines are in line with nature, with less hazardous reactions. Pyrexia or Fever is defined as an elevation of body temperature. It is a response due to tissue damage, inflammation, malignancy or graft rejection. Antipyretics are drugs which can reduce elevated body temperature. The objective of the present work was to study the antipyretic activity of plant *Hibiscus rosa sinensis* Linn. belonging to family Malvaceae which is considered as an important medicinal family and known as "Mandharai" in Telegu and "Semparutti" in Tamil. The Whole plant of *Hibiscus rosa sinensis* are used as analgesic, antiviral, anti-convulatory, anti-tumor, juvenoid activity, antifertility, hypotensive, anti implantation, depressant, anti-inflammatory and antiestrogenic activity. The petroleum ether and methanolic extract was taken for the study and evaluated for antipyretic activity using Brewer's yeast induced pyrexia in Wister strain albino rats. The petroleum ether and methanolic extracts at a dose of 200 mg/kg and 400mg/kg were evaluated for antipyretic activity. The methanolic extract of *Hibiscus rosa sinensis* (MEHRS) plant showed a significant ($P < 0.05$) dose dependent antipyretic effect in yeast induced elevation of body temperature in experimental rats. MEHRS have significant antipyretic activity when compared with the standard drug paracetamol. From the study, it concludes that the antipyretic activity observed can be attributed to the presence of flavonoids have been reported to exhibit antipyretic effect and therefore, supports the claims of traditional medicine as an antipyretic remedy.



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INTRODUCTION

Herbal products are often perceived as safe because they are “natural”. In recent years herbal medicine is a major component in all traditional medicine systems. Pyrexia or fever is caused as a secondary impact of infection, malignancy or other diseased states. It is the body’s natural defense to create an environment where infectious agent or damaged tissue cannot survive. Regulation of body temperature requires a delicate balance between production and loss of heat, and the hypothalamus which regulate the set point of body temperature⁽¹⁾.

Over the years, World Health Organization (WHO) advocated traditional medicines as safe remedies for ailments of both microbial and non-microbial origins, antipyretic⁽²⁾. The plants *Hibiscus rosa-sinensis* (*H. rosa-sinensis*) belongs to the family Malvaceae. Traditionally the flowers can be used as anti-asthmatic agents^(3,4). As the *Hibiscus rosa sinensis* Linn is a Folklore traditional medicament and cost effective alternative approach to study the leaves of this plant for the development of antipyretic agent. Some of the chemical constituents isolated from this plant are cyanidin, quercetin, hentriacontane, calcium oxalate, thiamine, riboflavin, niacin, ascorbic acid, and flavonoids⁽⁵⁾.

The flower contains apigenin, citric acid, cyanidin diglucoside, cyanine, fructose, gentisic acid, glucose, pelargonidin, quercetin, sucrose and tartaric acid. *Hibiscus rosa-sinensis* petal infusion is widely used in Ayurvedic medicine in India as a demulcent refrigerant drink in fever and decoction is given venin bronchodilator. Previous studies showed that the plant possesses anti-complementary, anti-diarrheic, anti-phlogistic activity. It has been reported that the plant flower possesses anti-spermatogenic and androgenic, anti-tumor and anticonvulsant activities⁽⁶⁾.

MATERIAL AND METHODS

Collection of the Plant Material

The leaves of *Hibiscus rosa sinensis* were collected from Suryapet, Telangana. They were identified and authenticated by Dr. Ashok Kumar, Head, Department of Pharmacognosy. Herbarium was prepared and submitted to museum bearing number PIPS/Herbarium-*Hibiscus Rosa*/2017.

Preparation of the Plant Extracts

Fresh leaves of (500 g) were taken and dried under the shade. The material was packed in Soxhlet apparatus and extracted by successive method with Petroleum ether (PEHRS) and methanol for 72 hours and the yield is 12.45 and 32.6 % respectively. Preliminary chemical analysis was performed to identify the bioactive components. Petroleum ether (PEHRS) and methanol extracts (MEHRS) of *Hibiscus rosa sinensis* at different doses of 200 and 400 mg/kg was suspended in distilled water and administered orally.

Experimental Design

Body weights of the animals (170-200 gms) were recorded and they were randomly divided into 6 groups of 6 animals each as follows:

Group I: Animals served as control,

Group II, III, IV and V: Animals were administered with yeast (10ml/kg,) and with PEHRS and MEHRS of 200 mg/kg body weight and 400 mg/kg, respectively by oral.

Group VI: Animals were administered with yeast (10 ml/kg) and the standard drug paracetamol (150 mg/kg body weight), orally.

Yeast induced pyrexia was induced by subcutaneous injection of 20 % w/v of brewer's yeast (10 ml/kg) in distilled water.

Basal rectal temperature was measured before the injection of yeast, by inserting digital clinical thermometer to a depth of 2 cm into the rectum. The rise in rectal temperature was recorded 18 h after yeast injection. Paracetamol 150 mg/kg body weight was used as the standard antipyretic drug.

Temperature was measured at 1st, 2nd, 3rd and 4th hour after drug administration.

Statistical Significance

The Statistical significance was analyzed using one-way ANOVA followed by Dunnett's test. $p < 0.001$ and $p < 0.05$ was considered as statistically significant.

Table 1. Effect of petroleum ether and methanol extract of *Hibiscus rosa sinensis* on yeast induced pyrexia in rats.

Groups	Rectal temperature (°C) before and after treatment					
	Initial	18 h after injection	60 min	120 min	180 min	240 min
Group I, Control (0.9% NaCl w/v, 5 ml /kg)	38.50±0.23	39.63±0.08	39.63±0.12	39.73±0.03	39.67±0.12	39.73±0.12
Group II, PCM (150 mg/kg)	38.70±0.15	39.37±0.08	38.76±0.12**	38.43±0.06*	38.17±0.08*	37.70±0.05*
Group III, PEHRS (200 mg/kg)	38.63±0.08	39.57±0.08	39.43±0.05	39.47±0.08	39.83±0.08	39.50±0.05
Group IV, PEHRS (400 mg/kg)	38.60±0.20	39.40±0.10	39.57±0.08	39.43±0.08	39.53±0.08	39.47±0.08
Group V, MEHRS (200 mg/kg)	38.57±0.19	39.67±0.08	39.20±0.12**	39.24±0.05*	38.13±0.05*	38.35±0.08*
Group VI, MEHRS (400 mg/kg)	38.40±0.15	39.53±0.12	38.93±0.17**	38.30±0.05*	38.23±0.14*	38.03±0.06*

PCM- Paracetamol, PEHRS- Petroleum-ether extract *Hibiscus rosa sinensis*, MEHRS- Methanolic extract of *Hibiscus rosa sinensis*

Values are mean ± SEM, n=6, All treated groups vs control group. * p < 0.001; ** p < 0.05.

RESULTS AND DISCUSSION

Treatment with the PEHRS at the dose of 200 mg and 400 mg/kg, body weight has not shown significant decreased rectal temperature of the rats and MEHRS at the dose of 200 mg and 400 mg/kg, body weight shown significant decreased rectal temperature in dose dependent manner. The antipyretic effect started from the first hour (p < 0.001) and was maintained for 4 hours (p < 0.05), after administration of the extract. The result obtained from PEHRS and MEHRS treated rats were compared with the control group. Fever may be due to infection or one of the sequels of tissue damage, inflammation, graft rejection, or other disease states. Antipyretic are 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⁽⁷⁾. 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.

CONCLUSION

From the study, it concludes that the antipyretic activity observed can be attributed to the presence of flavonoids to exhibit antipyretic effect and supports the claim.

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CONFLICT OF INTEREST

Conflict of interest declared none.

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