



ANTIPYRETIC ACTIVITY OF THE *PLUMERIA RUBRA* LEAVES EXTRACT

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ABSTRACT

Antipyretic effect of ethanolic extract of the leaf of *plumeria rubra* was investigated. Intraperitoneal administration of boiled milk at a dose 0.5 ml/kg body weight in albino rabbit leads to pyrexia. Intraperitoneal (i. p. route) administration of ethanolic extract of the leaf of *plumeria rubra* at a dose 200mg/kg body weight were shown significantly reduce the elevated body temperature of rabbit which was compared with aspirin (Standard Drug) and solvent used.

Keywords: *Plumeria rubra*, Leaves extract, Antipyretic activity

INTRODUCTION

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. [1] Normally the infected or damaged tissue initiates the enhanced formation of pro-inflammatory mediator's (cytokines like interleukin 1 α , α , and TNF- α), which increase the synthesis of prostaglandin E2 (PGE2) near peptic hypothalamus area and thereby triggering the hypothalamus to elevate the body temperature. [2] 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 become 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. [3] Most of the antipyretic drugs inhibit COX-2 expression to reduce the elevated body temperature by inhibiting PGE-2 biosynthesis. Moreover, these synthetic agents irreversibly inhibit COX-2 with high selectivity but are toxic to the hepatic cells, golmeruli, cortex of brain and heart muscles, whereas natural COX-2

inhibitors have lower selectivity with fewer side effects. [4] *Plumeria rubra* L (Hindi name: Lal champa; English: True Frangipani) belongs to the Apocynaceae family and have laticiferous trees and shrubs. The plants from this genus are widely cultivated in the tropical and subtropical regions throughout the world. [5] They are recognized as excellent ornamental plants and often seen in the graveyards. [6] Plants are famous for their attractiveness and fragrant flowers. The essential oils from the flowers are used for perfumery and aromatherapy purposes. The decoction of the bark and roots of *Plumeria rubra* is traditionally used to treat Asthma, ease constipation, promote menstruation and reduce fever. The latex is used to soothe irritation. [7] The fruit is reported to be eaten in West Indies. In India, however, it has been used as an abortifacient. [8] The flowers are aromatic and widely used in pectoral syrups. The flowers decoction of *P. rubra* was reported to be used in Mexico for control of diabetes mellitus. The leaves of *P. rubra* are used in ulcers, leprosy, inflammations and rubefacient. [9] *Plumeria rubra* Linn. is a thick deciduous tree. Plant loses leaves for a short time during the winter. It grows up to height 25 feet. Plant growth rate is slow. About eight species of *Plumeria rubra* (L.) are available in India. The ascending leaves are simple alternate, spiral, petiole undissected, elliptic or ovate

shape, base tapering (narrow attenuate) or oblique, margins entire or undulate, apex acuminate or acute or obtuse. Pink or red color flowers, spreading cymes fruits elongated. ^[10] Flowering period is August to October. According to ayurveda, root is bitter, carminative, thermogenic, laxative, leprosy etc. Leaves are useful in inflammation, rheumatism, antibacterial, bronchitis, cholera, cold and cough, antipyretic, antifungal, stimulant etc. ^[11]

MATERIALS AND METHODS

Collection and preparation of Plant Extract: The leaves of *Plumeria rubra* were collected from the Fields of Allahabad and transported on the same day to the laboratory of university. The specimen was further authenticated by Dr. D. C. Saini, Scientist 'E', Birbal Sahni Institute of Palaeobotany, Lucknow, India (Registration no – 13381).

Preparation of aqueous extract of *Punica granatum*: Green leaves of the *Plumeria rubra* were dried in shade for one month duration. Dried leaves were crushed in semi solid mass. Then half a kilogram of the semisolid mass was Subjected to the Soxhletation for 72 hrs. The ethanol is evaporated then the dried mass was kept in a desicator and was used, as and when required for the experiment.

Drug: Aspirin as Disprin soluble tablet was collected from local market of Mathura U.P. was used as known antipyretic agent. The standard solution was prepared by dissolving the tablet in the solvent to obtain 15 mg aspirin per 2 ml solution. The dose of aspirin was maintained 10 mg/kg body weight. ^[12]

Animals: The experiment was carried out on albino rabbits. They were 13-15 months old of both sexes weighing between 1.5-1.6 kg. ^[13] They were collected from the C.D.R.I. Lucknow. The rabbits were kept in iron cages ^[14] (considering group), were fed with cauliflower, cabbage, banana and tap water for 40 days before experiment to adjust with environment. Food and water were withdrawn 6 hours prior to the experiment. The animals were grouped as:

- a. Experimental groups- One group receiving ethanolic fraction of *plumeria rubra*
 - b. Control groups were-
 1. Aspirin group (+Ve Control) - receiving standard antipyretic agent aspirin.
 2. Solvent group (-Ve Control) - receiving solvent (used).
- Number of rabbits in each group was four.

Acute Toxicity Study: Acute toxicity study was carried out by using graded doses of drug were administered intraperitoneally in graded doses (200

to 1000 mg/kg body weight). They were observed continuously for the first 2 h for toxic symptoms and up to 24 h for mortality. ^[15]

Antipyretic test: Before experimentation rectal temperature of rabbits were recorded by inserting a well lubricated bulb of a thermometer in the rectum. Care was taken to insert it to the same depth each time (about 6 cm). Milk was collected from local cow had been boiled. When temperature of the boiled milk equilibrates to room temperature then rabbits were injected boiled milk at the dose of 0.5 ml/kg body weight, to induce pyrexia. Induction of fever was taken about one to two h. ^[16] and then ethenolic extract of drug is given to one group and aspirin is given to another group and in control solvent is given (Table 1). Intraperitoneal route was used to administer boiled milk, aspirin solution, and sample solution. Finally, rectal temperatures were recorded 1 h intervals up to 3 h.

RESULTS AND DISCUSSION

The preliminary phytochemical screening of the ethenolic extract showed the presence of plant phytoconstituents such as carbohydrates, alkaloids, glycosides, flavonoids, tannins and saponins were carried out on the powdered leaves following standard procedure. In acute toxicity study, it was found to be safe and no mortality was observed to a dose as high as 1000 mg/kg. The results of effect of ethenolic extract of *Plumeria rubra* leaves on boiled milk induced pyrexia in rabbits are depicted in Table 1. Ethenolic extract produced significant ($P < 0.05$) antipyretic effect. At a dose of 200 mg/kg body weight, ethenolic extract reduced elevated rectal temperature compared to aspirin after 3 hours. The acute toxicity result reveals that this plant might be considered as a broad non-toxic one. The antipyretic activity exhibited that the ethanol extract of leaf possess a significant antipyretic effect in maintaining normal body temperature and reducing boiled milk induced elevated rectal temperature in rabbits and their effect are comparable to that of standard antipyretic drug aspirin. Such reduction of rectal temperature of tested animals by the extract at 200 mg/kg appears to be due to the presence of a single bioactive principles or mixture of compounds in them. The phytochemical analysis of the fractions showed the presence of tannins and flavonoids. The antipyretic activity observed can be attributed to the presence of flavonoids have been reported to exhibit antipyretic effect. The present study, therefore, supports the claims of traditional medicine practitioners as an antipyretic remedy.

CONCLUSION

In the present study, the aqueous extract of *Plumeria rubra* seed was shown to possess significant Antipyretic activity. During extraction, the average percentage yield of aqueous extract of *Plumeria rubra* seed was found to be 3.17% w/v. The extract showed significant anti-pyretic property. In conclusion, it can be said that the ethanolic extract of the leaves of *Plumeria rubra* has significant anti-

pyretic activity. Further researches are also being carried out in our department to explore the phytochemistry and other pharmacological activities.

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Table 1: Effect of ethanolic extract of *Plumeria rubra* leaves on boiled milk induced pyrexia in rabbit

Rectal temperature (F)		Rectal temperature (F) after Administration of drug				
Group	Dose	Normal	3 hrs after boiled milk admin	After 1 hour	After 2 hour	After 3 hour
Solvent	2ml/rabbit	101.2±0.5	104.2±0.6	103.9±0.2	103.9±0.23	103.2±0.63
Asprin	10mg/kg	101.5±0.6	104.3±0.2	102.6±0.3	101.5±0.6*	101.1±0.1*
Ethanolic extract	200mg/kg	101.7±0.7	104.4±0.8	102.5±0.35	101.2±0.7*	101.3±0.22*

All values are expressed as mean±SE (n = 4), percentage reduction in rectal temperature is given within parentheses.

* P < 0.05 significant compared to control.

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