



ORIGINAL RESEARCH PAPER

Pharmacology

EVALUATION OF ANTIPYRETIC ACTIVITY OF WITHANIA SOMNIFERA: AN EXPERIMENTAL STUDY

KEY WORDS: Pyrexia, Withania somnifera, Brewer's yeast.

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ABSTRACT

Introduction - Pyrexia or Fever is defined as an elevation of body temperature. Increased level of PGE2 is responsible for pyrexia. In modern medicine NSAIDs are used to treat pyrexia. NSAIDs are usually associated with various gastrointestinal side effects. Various medicinal plants are also used in the management of pyrexia.

Objective – To evaluate the antipyretic activity of Withania somnifera in albino rates.

Methods - The present study was conducted on adult rats (100-150 gm) of either sex. Method to study anti pyretic activity is Brewer's yeast induced pyrexia method. The results obtained for both the standard drug-treated and Withania somnifera treated rats were compared with the control (0.9% Normal Saline) group.

Results - It was found that Withania somnifera at a dose of 800 and 1600 mg/kg caused significant lowering of body temperature at 90 and 120 min.

Conclusion – Withania somnifera has significant antipyretic activity which may be due to some active ingredient which requires further exploration.

INTRODUCTION –

Pyrexia or Fever is defined as an elevation of body temperature. It is our body's response due to any inflammation and tissue damage. Temperature regulating centre of human body is present in Hypothalamus of brain. Cytokines, interleukins, interferon and Tumour Necrosis Factor α (TNF- α) are formed in large amount during pyrexia, which increases PGE₂, which in turn increase temperature set-point in the hypothalamus to elevate body temperature [1].

Fever is associated with symptoms of lethargy, depression, anorexia, sleepiness, & inability to concentrate. Various conventional interventions employed in fever management include removal of clothes from the patients as well as use of cold sponging. This helps in conductive heat loss from body [2]. Various antipyretic medications can be effective at lowering the temperature which may increase the comfort of patient [3]. In modern medicine various drugs like Nonsteroidal anti-inflammatory drugs (NSAIDs) used to reduce elevated body temperature. NSAIDs are usually associated with various gastrointestinal side effects [4].

In India medicinal plants are assuming greater importance in the primary health care of individuals and communities. Indian medicinal plants and their derivatives have been an invaluable source of therapeutic agents to treat various disorders. Medicinal plants also form an integral part in the management of fever. A wide variety of these medicinal plants are currently used in the management of fever like Acacia hockii [5] Cissus quadrangularis [6] Urtica dioica [7].

Withania somnifera is a medicinal plant, which is from ancient time frequently used to improve the total body's ability to maintain physical effort and helps to get the body relieve stress, fatigue and sleeplessness. It has anti-depressant, anti-oxidant activity and known for its anti-aging and longevity benefits [8]. Present study is carried out to explore the antipyretic potential of Withania somnifera in animal models.

MATERIAL AND METHODS

The present study was conducted on adult rats (100-150 gm) of either sex. The rats were acclimatized to laboratory condition for 15 days before commencement of experiment. The animals (six per cage) were maintained under standard laboratory conditions (light period of 12 h/day and at room temperature), with access to commercial pellet diet and water ad libitum. Food was withdrawn 12 h before and during the

experimental hours. Method to study anti pyretic activity is Brewer's yeast induced pyrexia method. [9]

The brewer's yeast induced pyrexia method was assessed on rats. Normal rectal temperature of male rats weighing between 100-150g was recorded by clinical thermometer and its hourly variation was noted over a period of three hours at the beginning of experiment. The room temperature remained constant during the experiment. Pyrexia was produced by injecting 10ml/kg of 15% suspension of dried brewer's yeast (*Saccharomyces cerevisiae*) in 2% gum acacia in normal saline subcutaneously on the back. The rectal temperature is noted after 15 hrs of inducing agent brewer's yeast and then after treatment orally with saline or standard anti-pyretic drug or in graded three doses of Withania somnifera at 1/2hr intervals for 2hrs into following groups.

Group I was treated with control vehicle 5ml/kg of 0.9% NaCl solution oral, once

Group II was treated with a test drug, a standard antipyretic agent Paracetamol 150mg/kg oral, once

Groups III, IV and V were treated with 400, 800, 1600 mg/kg oral doses of Withania somnifera respectively once

RESULTS -

It was found that Withania somnifera at a dose of 800 and 1600 mg/kg caused significant lowering of body temperature at 90 and 120 min. The results obtained for both the standard drug-treated and Withania somnifera treated rats were compared with the control (0.9% Normal Saline) group. The rats treated with paracetamol 150 mg/kg orally produced fall in temperature in pyretic rat from initial mean 38.43±0.15°C to 38.30°C at 30 and 60 min respectively (P<0.01) and to 38.23±0.06°C and 38.16±0.05°C at 90 min and at 120 min respectively. Treatment with different doses of Withania somnifera too lowered down the rectal temperature of pyretic rats but significantly at the higher dose of 800 and 1600mg/kg at 90min and 120min respectively (P<0.001).

Table 1 - Effect of Withania and Paracetamol on brewer's yeast induced pyrexia in albino rats:

Drug	Dose (mg/kg, oral)	Temperature °C±SD					
		Initial	Pyretic	30 min	60 min	90 min	120 min
Saline	5 ml	38.13 ±0.15	39.33±0.20	39.60 ±0.17	39.83 ±0.11	40.10 ±0.10	40.26 ±0.11

Paracetamol	150	38.10 ±0.10	39.63± 0.11	38.43 ±0.15 **	38.30 ±0.11 **	38.23 ±0.06 **	38.16 ±0.05 **
Withania	400	38.13 ±0.15	39.66± 0.15	39.76 ±0.11	39.73 ±0.10	39.66 ±0.06 **	39.66 ±0.06 **
Withania	800	38.12 ±0.14	39.99± 0.15	39.63 ±0.06	39.56 ±0.06	39.46 ±0.11 **	39.46 ±0.11 **
Withania	1600	38.16 ±0.15	39.60± 0.10	39.56 ±0.06	39.36 ±0.06 *	39.35 ±0.05 **	39.23 ±0.05 **

DISCUSSION-

Prostaglandin (PGE₂) acts on the thermoregulatory centre in hypothalamus of the brain and play a vital role in temperature regulation. Fever is an important sign for clinician to alerts them early to intervene [10].

The majority of NSAIDs work by inhibiting the COX enzyme involved in prostaglandin synthesis and thereby reduce the PG level. Reference antipyretic drug Paracetamol, used in this study, also has same effect by a selective action on a specific cyclooxygenase enzyme (COX) in the central nervous system (CNS)[11]. The antipyretic effect of *Withania somnifera* might also be linked to the prevention of prostaglandin formation. These results also propose that the presence of certain active ingredient may be responsible for the reported antipyretic effect of *Withania somnifera*, the separation of which could facilitate to obtain better antipyretic drugs with precise mechanism of action.

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