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Anti-Inflammatory and Anti-Pyretic Activities Of *Allamanda cathartica* L. Leaves In Rats

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ABSTRACT

The ethanolic extract of *Allamanda cathartica* L. at doses of 100, 250 and 500 mg/kg was investigated for anti-inflammatory and antipyretic activities on carrageenan induced rat paw edema and brewer's yeast-induced pyrexia in rats. In the systemic edema of the rat paw, the extract significantly ($P < 0.05$) suppressed the development of paw edema. The anti pyretic effect of ethanolic extract of *Allamanda cathartica* on yeast significantly ($P < 0.01$) decreased in body temperature. The results obtained in this study proved that the leaves of *Allamanda cathartica* had good pharmacological activity, which is the basis for the traditional use of the plant.

Keywords: *Allamanda cathartica*, Anti-Inflammatory, Anti-Pyretic, Rats, leaves extracts

Introduction

In developing countries, it is estimated that about 80 % of the population really depends on traditional medicine for their primary healthcare. There arises a need to screen medicinal plants for bioactive compounds as a basis for further pharmacological studies [1]. Plants are rich sources of secondary metabolites with interesting biological activities. In general, these secondary metabolites are an important source with a variety of structural arrangements and properties [2]. Increasing recognition of herbal medicine as an alternative form of health care, it is screen necessary to the medicinal plants for active compounds [3]. *Allamanda cathartica* L (*A. cathartica*), commonly was known as the Yellow Bell, Golden Trumpet or The Buttercup flower the family Apocynaceae [4]. All parts contain the iridoid lactone and allamandin [5]. The bark, latex and the infusion of its leaves in small doses is cathartic and the

decoction of its bark is a hydragogue. There has been no report stating the use of *A. cathartica* for medicinal purposes in India [4].

Materials and Methods

Preparation of plant extract

The leaves of *Allamanda cathartica* were collected from the natural habitats of Thiruvavur district, Tamilnadu, India and was identified and authenticated by Dr. S John Britto, Department of Botany, St. Joseph's college, Trichirappalli [VC number: SS 001]. The leaves were dried in the shade and the powdered material was macerated with 70% ethanol at room temperature for 3 days and then suction filtered through a Buchner funnel. The solvent was removed by rotary evaporation under reduced pressure at a temperature below 45 °C. The resulting ethanolic extract was kept at 20 °C until screening for their antipyretic and anti-inflammatory activity.

Experimental animals:

Male albino rats of Wistar strain of 140-160 g were used in this study. The animals were housed in spacious polypropylene cages bedded with rice husk. The animal room was well ventilated and maintained under standard experimental conditions

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(Temperature 27 ± 2 °C and 12 hours light / dark cycle) throughout the experimental period. All the animals were fed with standard pellet diet (Gold Mohur, Mumbai, India) and water *ad libitum* and were acclimatized to the environment for 1 week prior to experimental use.

Carrageenan induced rat paw oedema was produced according to the technique of Winter *et al* [6]. After 12 hrs fast rats were divided into five groups of six each. Acute inflammation was produced by the subplantar administration of 0.1 ml of 1% carrageenan in normal saline in the right paw of the control and experimental rats. Group I served as control group received 2mg/kg carrageenan only. Group II to IV animals received leaves extract of *Allamanda cathartica* at a dose of 100, 250 and 500 mg/kg. Group V received 2 mg/kg (ip) Dexamethasone. The paw was marked with in at the level of lateral malleolus and immersed in mercury up to the mark and measured by mercury volume displacement methods. The paw volume was measured $\frac{1}{2}$, 1, $1\frac{1}{2}$ and 2 hours after injection of carrageenan to each group and the percentage of anti-inflammatory activity was calculated [6,7].

Antipyretic activity was done by slightly modifying the method of Adams and colleagues [8]. Rats were fasted overnight with water *ad libitum* before the experiments. Animals were divided into five groups containing six animals each. Pyrexia was induced by subcutaneously injecting 20 % w/v brewer's yeast suspension (10 ml/kg) into the animal's dorsum region. Group I was given saline, II, III and IV group were given 100, 250 and 500 mg/kg of the extract, respectively, and the V group was given as standard Paracetamol (200 mg/kg b.w.). After 19 hour of the injection, the rectal temperature of each rat was measured using a digital thermometer (SK-1250 MC, Sato keiryoki Mfg.). Only rats that showed an increase in temperature of at least 0.7 °C were used for experiments.

Results and Discussion

Medicinal plants form the backbone of traditional medicine in the last few decades with intense pharmacological studies. They are regarded as potential sources of new compound of therapeutic value and as sources of lead compounds in drug development. Administration of *Allamanda cathartica* leaves reduces the paw edema in the inflammatory rats at a dose of 500 mg (kg b.w) (Table 1). A significant decrease of paw edema was noted in herbal drug treated animals and it was comparable to that of reference drug. The result presents here may help to establish the scientific basis for utilization *Allamanda cathartica* leaf for the treatment of pain and inflammation in folk medicine. The findings of this study have demonstrated that ethanol extract of *Allamnada cathartica* has got significant anti-inflammatory activity in carrageen induced paw edema. Carrageen injection in to the rat paw provokes a local, acute inflammatory recant that is suitable criteria for evaluation of anti inflammatory [6]. Carrageen induced inflammation is a useful model to detect the anti inflammatory agents [9]. The development of edema in the paw of the rat after the injection of carrageen is due to release of histamine, serotonin and prostaglandin like substance [10]. The significant activity of the ethanol extract and the standard drug observed in the present study may be due to the inhibition of mediators of inflammation such as histamine, serotonin and prostaglandin. The maximum effect was exhibited by ethanol extract, was due to the flavonoids are responsible for anti-inflammatory activity [11]. The ethanol extract has activity, which is comparable to dexamethasone, and it was inhibiting the cyclooxygenase enzyme. The results indicate that leaves extract of *Allamanda cathartica* has potent anti-inflammatory activity than standard drug [12].

Antipyretic activity of the ethanolic extract of *Allamanda cathartica* leaves was also studied in the experimental animals. The subcutaneous injection of yeast suspension markedly

Table 1: Anti-inflammatory of *Allamanda cathartica* on carrageenan induced paw oedema

Doses	1/2 hour	1 hour	1½ hour	2 hour
Control	-	-	-	-
100 mg/ml	28.12± 2.53	25.46± 2.29	25.08± 2.25	24.37± 2.19
250 mg/ml	37.5± 3.37	39.43± 3.54	40.15± 3.61	43.22± 3.88
500 mg/ml	49.31± 4.07	53.25± 4.79	55.46± 4.99	58.80± 5.29
Standard (2 mg/kg Dexamethasone)	41.25± 2.81	45.32± 4.07	49.71± 4.47	52.56± 4.73

Values were expressed in % of inhibition as Mean $\pm$ SD for six rats.

elevated the rectal temperature after 18 hrs of administration. (Table 2). Treatment with *Allamanda cathartica* leaf extract decreased the rectal temperature of the rats in dose dependent manner. It was found that the extract at a dose of 100 mg/kg caused significant lowering of body temperature at 4 hrs following its administration and this effect was maximal at dose of 500 mg/kg. Both the standard drug paracetamol 200 mg/kg and tested drug *Allamanda cathartica* extract were significantly reduce the yeast-elevated rectal temperature, at 2nd, 3rd and 4th hour compared to control group. Subcutaneous injection of Brewer's yeast induces pyrexia by increasing the synthesis of prostaglandin. It is considered as a useful tested for the screening of plants materials as well as synthetic drugs for their antipyretic effect [13,14]. Yeast induced pyrexia is called pathogenic fever and its etiology could be the production of prostaglandin [15]. The inhibition of prostaglandin can be synthesis could be the possible mechanism of anti pyretic action as that of paracetamol and the inhibition of prostaglandin can be achieved by blocking the cyclooxygenase enzyme activity. There are several mediators for pyrexia and the inhibition of these mediators is responsible for antipyretic effect [16]. In this study, the extract reduced the yeast elevated rectal temperature in experimental animals. To produce a novel drug in the pharmaceutical field further investigation was needed to isolate and identify the compounds.

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Table 2: Antipyretic activity of *Allamanda cathartica* extracts on Yeast-induced hyperpyrexia in rats

Doses	0 hour	1 hour	2 hour	3 hour	4 hour
Control	38.70 ± 0.54	38.30 ± 0.49	38.59 ± 0.44 ^a	38.14 ± 0.35 ^a	38.83 ± 0.25 ^a
100 mg/ml	38.84 ± 0.88	36.63 ± 0.32 ^a	36.19 ± 0.31 ^a	36.08 ± 0.31 ^a	36.08 ± 0.32 ^a
250 mg/ml	38.44 ± 0.77	36.16 ± 0.38 ^a	35.64 ± 0.54 ^a	36.22 ± 0.37 ^a	36.15 ± 0.24 ^a
500 mg/ml	38.41 ± 0.91	36.03 ± 0.32 ^a	35.47 ± 0.32 ^a	35.72 ± 0.33 ^a	35.39 ± 0.24 ^a
Standard (200mg/kg) Paracetamol	38.86 ± 0.90	36.32 ± 0.33 ^a	35.79 ± 0.34 ^a	36.34 ± 0.30 ^a	36.38 ± 0.30 ^a

^a P < 0.01 Compared with group I

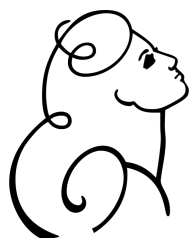
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