Pharmacological evaluation of ethanolic extracts of the plant *Alternanthera sessilis* against temperature regulation

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### ABSTRACT

#### Purpose: The antipyretic activity of the 90 % ethanol extract of the aerial parts of *Alternanthera sessilis*. (Amaranthaceae) was investigated in order to verify its claimed ethno medicinal use in the treatment of fever. Method: The antipyretic activity of Alternanthera sessilis extract (ASE) was investigated for its, potential on normal body temperature and yeast-induced pyrexia in albino rats. Results: The ASE at doses of 200, and 400 mg/kgBW p.o., showed significant reduction in normal body temperature and yeast-provoked elevated temperature in a dose-dependent manner. The effect also extended up to 4 h after the drug administration. The anti-pyretic effect of ASE was comparable to that of paracetamol (150 mg/kg p.o.), a standard anti-pyretic agent. Conclusion: Based on the results of the present study it can be concluded that the extract of A. sessilis has potential antipyretic activity. The activity is in dose dependent manner. Consequently our present study gives a scientific ground to the traditional uses of the plant *A. sessilis*

### Keywords: *Alternanthera sessilis*, yeast-induced pyrexia, antipyretic activity

### INTRODUCTION

*Alternanthera sessilis* (Amaranthaceae) is widespread throughout the tropics and subtropics. In India it is found throughout the hotter parts, ascending to an altitude of 1,200 m in the Himalayas and even cultivated as a pothor [1]. It has been used in Indian traditional system of medicine since a long time in diseases due to vitiated blood, skin diseases and ulcers [2]. Its active principles, extracted in oil, were used to treat infected wounds and the herb also proved styptic in colitis; its nutritive values make the herb a potent tonic with a wide range of applications. Poultice of pounded fresh material is used in sprains, burns and eczema, carbuncle, erysipelas and acute conjunctivitis. It is also used as a cholagogue (increases bile flow in liver), abortifacient (causes abortion) and febrifuge (reduces fever) and to treat snakebites, dysentery, diarrhoea, skin problems inflamed wounds and boils, and applied on acne and pimples [3,4]. In some parts of Bihar (India) the plant is used for hazy vision, night blindness, and post-natal complaints. *A. sessilis* has been reported to posses anti-microbial, molluscicidal, a moderate antimitagenic, antidiarrhoeal hepatoprotective and cytotoxic activities [5,6]. Previous phytochemical studies have reported the isolation of flavonols, triterpenoids, steroids and tannins; β-sitosterol, stigmasterol, campesterol, lupeol being few of its important constituents [6,7]. Based on the traditional use of the plant as an anti-pyretic agent, the present study was carried out in an experimental animal model to substantiate the folklore claim.

### MATERIALS AND METHODS

#### Plant material

The flowering whole plants were from Utkal University, Bhubaneswar, Orissa during the month of Nov-Dec and identified by the botanist of Department of Botany, Utkal University, Bhubaneswar by comparing with the voucher specimen present in the herbarium. After authentication fresh plant materials were collected in bulk, washed under running tap water to remove adhering dust, dried under shade and pulverized in a mechanical grinder. The coarse powder was used for further studies.

#### Preparation of extract

Fresh plant, after collection was shade dried, defatted with hexane and then extracted with ethanol by soxhlet apparatus. The ethanolic extract (yield 12.5 % w/w of total powdered drug) was further extracted with chloroform. The chloroform insoluble fraction (yield 8.5 % w/w of total powdered drug) was dried at 40°C under vacuum and refrigerated till the drug was required for any further application.

#### Animals

In-bread Wistar Albino rats (200-250 grams) were selected for these studies. Six rats were kept for each group. The rats were used after an acclimatization period of 7 days to the laboratory environment. They were provided with food and water adlibitum. The experimental protocol is approved by the institutional Animal Ethics committee I.A.E.C/U.D.P.S/990/2005-Vanivihar, Bhubaneswar. Following C.P.C.S.E.A guideline. All the experimental works were carried out in the university dept. of pharmaceutical sciences, Utkal university, Orissa.

#### Study on normal body temperature

Rats of either sex were divided into groups comprising six in each group. The body temperature of each rat was measured rectally at predetermined intervals before and for 5 hour after administration of either 2% aqueous Tween 80 solution (control) or plant extract at doses of 200 and 400-mg/kg body weight orally.

#### Induction of yeast-induced pyrexia

Rats were divided into five groups of six rats each. The normal body tempera-
The rectal temperature of each rat was measured rectally at predetermined intervals and recorded. The rats were acclimatized to remain quiet in a restraint cage. A thermister probe was inserted 3–4 cm deep into the rectum and fastened to the tail by adhesive tape. The temperature was measured on a thermometer. After measuring the basal rectal temperature, animals were given a subcutaneous injection of 10-ml/kg body weight of 15% (w/v) yeast suspended in 0.5% (w/v) methylcellulose solution. Rats were then returned to their housing cages. After 19 h of yeast injection, the animals were again restrained in individual cages for the recording of their rectal temperatures as described previously.

**Drug administration**

Nineteen hour after yeast injection the drug extract was administered orally at doses of 200 and 400 mg/kg body weight, to different groups, respectively. A similar volume of (5 ml/kg) 2% aqueous Tween 80 solution was administered orally to the control group. Another group of rat received the standard antipyretic drug paracetamol at a dose of 150 mg/kg orally. Rats were restrained for recording the rectal temperatures at the 19th hour immediately before the administration of the extract, 2% Tween 80 solution or paracetamol, and again at 1 h intervals up to 23 hours.

**Statistical analysis**

The statistical analysis was performed by using one-way analysis-of-variance (ANOVA) followed by Dunnet’s test for individual comparison of groups with control. p-values <0.05 were considered as significant. The values are represented as the mean ± SEM for six rats.

**RESULT AND DISCUSSION**

Fever may be a result of infection or one of the sequels of tissue damage inflammation, graft rejection, or other disease states. Antipyretics are drugs,
which reduce the elevated body temperature. Regulation of body temperature requires a delicate balance between the production and loss of heat. Hypothalamus regulates the set point at which body temperature is maintained. In fever this set point is elevated and drugs like paracetamol do not influence body temperature when it is elevated by factors such as exercise or increases in ambient temperature.\[8\].

Although this plant is widely used for diminution of several ailments related to fever, its antipyretic potential has not been explored yet. The present study, for the first time performed to evaluate the antipyretic activity of \textit{A. sessilis}. The results showed that the extract of \textit{A. sessilis} possesses a noteworthy antipyretic effect in maintaining normal body temperature (Table and Fig. 1) and reducing yeast-induced elevated body temperature in rats at both the tested doses (Table and Fig. 2). Its effect at the highest tested dose is comparable to that of the standard antipyretic drug paracetamol. The significant reduction of yeast provoked elevated temperature of the tested animals by the extract appears to be due to the action of \(\beta\)-sitosterol, lupeol and related compounds alone or in combination, which have been previously reported to be present in this plant.\[9,10\]. The \(\beta\)-sitosterol, a phytosterol with an extra alkyl group at C-24 in the side chain, is a plasminogen activator and promotes the formation of essential polyunsaturated fatty acids from linoleic acid, required for prostaglandin and leukotriene synthesis.\[9\] \(\beta\)-sitosterol and its glycoside possess potent anti-inflammatory and antipyretic activity.\[11\], by reducing the secretion of proinflammatory cytokines and TNF-\(\alpha\).\[11,12\]. Based on the results of the present study it can be concluded that the extract of \textit{A. sessilis} has potential antipyretic activity. The activity is in dose dependent manner. Consequently our present study gives a scientific ground to the traditional uses of the plant \textit{A. sessilis}.

\[REFERENCE\]