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EVALUATION OF ANTIPYRETIC POTENTIAL OF HYDROALCOHOLIC EXTRACT OF *AERVALANATA* LEAVES

Rukmani Singh*, Brijesh Sirohi, S.K. Lariya

Radharaman College of Pharmacy, Bhopal (M.P.)

Corresponding Author's email ID: rukmanisingh804@gmail.com

Abstract

Pyrexia occurs due to infection, malignancy and other diseases. Majority of the antipyretic drugs are synthetic in nature which exerts side effects such as gastric ulcer, hepatic necrosis and renal damage. The antipyretic potential of the hydro-alcoholic extracts *Aervalanata*were investigated on the brewer's yeastpyrexia in albino wistar rats.Qualitative & quantitative estimation was also performed. Total phenol & flavonoid content was found to be 0.374 mg/100mg and 0.685 mg/100mg of dried extract. Hyperthermia was induced by subcutaneous injection of 20% (w/v) aqueous suspension of brewer's yeast. Paracetamol was used as positive control.Rectal temperature of albino rats was verified immediately before the administration of the extracts or vehicle or paracetamol and yet again after 18 hours. Animals were divided into four groups with six animals in each group. Group Group III&Group IV were given Hydroalcoholic extract of *Aervalanata* at dose of 250 mg/kg & 350mg/kg respectively. Results showed that the hydroalcoholic extract of *Aervalanata*at dose of 205 mg/kg & 350 mg/kg found to have rectal temperature as 38.19± 0.23 and 37.82± 0.18 degree Celsius respectively. These results are apparently close to the effect of standard paracetamol at dose of 150 mg/kg which was found to be 37.62±0 .11 degree Celsius. So, it is evident that *Aervalanata*leaves have antipyretic potential close to that of standard drug paracetamol.

Keywords: Anti-Pyretic, *Aervalanata,* Herbal medicine, Fever

Introduction

Fever refers to the body's temperature that is higher than the normal range due to an increase in set-point temperature in the hypothalamus. It is a common sign in medicine that shows body temperature elevation above the standard range of 36.5–37.5 °C. Increased prostaglandin E2 (PGE2) biosynthesis in the hypothalamic pre-optic region alters the neuron firing rate, leading to fever induction (Prajitha *et al*., 2018).

For years, natural treatments and particularly therapeutic vegetation had been the primary or even the sole alternative of our ancestors for their remedy. However, despite the development of the pharmaceutical industry, medicinal plants and treatments that could be drawn were never abandoned entirely, and people continue to resort to traditional medicine. Natural products are believed to be an essential source of new chemical substances with the potential therapeutic application. Several plant species were traditionally used as analgesic (Venkateswarluand Ganapathy, 2018)

The plant *Aervalanata* is used in traditional medicine for cough, strangury (slow to be and painful discharge of urine), headache and urolithiasis. The photochemical constituents present in the plant include alkaloid, flavonoids, methyl grevillate, lupeol, lupeol acetate benzoic acid, β-sitosteryl acetate and tannic acid. Pharmacological studies reported it has diuretic, anti-inflammatory, hypoglycemic, anti-diabetic, antiparasitic, antimicrobial, hepoprotective, anti-urolithiasis, antiasthmatic, antifertility and hypolipidemic properties (Goyal *et al*., 2011)

This study attempts to analyse the antipyretic activity of*Aervalanata* in brewer's yeast induced pyrexia in albino rats.

Materials & Methods

Materials

Plant material

Leaves of *Aervalanata*were collected in the month of March 2022, from local area of Bhopal (M.P.).

Animals

Albino mice (25 -35 g) were used for acute toxicity study and Wistar rats, weighing 150 – 200 g were used for anti-pyretic study. The animals were kept in polypropylene cages in a room maintained under controlled atmospheric conditions. The animals were fed with standard diet (Hindustan liver, Mumbai, India) and had free access to clean drinking water. Pharmacological study was approved by Animal Ethical Committee.

Methods

Plant extraction

62.87 gram of powdered leaves of *Aervalanata*were coarsely powdered and subjected to extraction with petroleum ether by maceration method. The extraction was continued till the defatting of the material had taken place. Defatted dried powdered of *Aervalanata*has been extracted with hydroalcoholic (Methanol: Water: 80:20v/v) as a solvent using maceration method for 48 hrs, filtered and dried using vacuum evaporator at 40°C(Silva *et al.,* 2017; Evans, 2009).

Determination of percentage yield& phytochemical examination

The percentage yield of each extract was calculated &Phytochemical examinations were carried out extracts as per the standard methods(Tiwari *et al.,* 2011).

Estimation of total phenol & flavonoid content

Total phenol content was determined by Folin- Ciocalteu method while total flavonoid content was esrtimated by aluminum chloride method.

Acute toxicity studies

In the acute toxicity test carried out in mice we take eight doses and 10 mice in each dose of hydroalcoholic extract of *Aervalanata*i.e. 500, 1000, 1500, 2000 2500 and 3000 mg/kg body weight. All groups of test drug showed neither any toxic effect nor any lethal effect in the dose range of 500 to 3000 mg/kg body weight. So we had taken a dose 200 mg/kg and 300 mg/kg of body weight for Hydroalcoholic extract for further screenings (Niazi*et al*., 2010: Hajaree*et al*., 2000: Cheng *et al*., 2005).

Twentyfour male rats were randomly allotted to four groups (6 animals per group). After measuring the rectal temperature of all the rats, hyperthermia was induced by

subcutaneous injection of 20% (w/v) aqueous suspension of brewer's yeast. After 18 hours of yeast induction rectal temperatures were measured and only rats those show an increase in temperature by 0.7ºC and more from baseline was used for the study.

Grouping of Animals

Groups I were assigned as vehicle control and administered with Water for Injection (10 ml/kg). Group II were administered with paracetamol (150 mg/kg) and served as positive control. Groups III and IV were administered with hydroalcoholic extract of *Aervalanata*at the dose of 250 and 350 mg/kg respectively.

Statistical analysis

Data were analyzed using one way ANOVA followed by Dunnett T method as post-hoc test. All values were reported as mean ± SEM. Statistical significance was set at $p \leq 0.001$.

Results

The moderately coarse powder of the *Aerva lanata* was subjected to extraction by macerating method with hydroalcoholic as a solvent. The obtained extracts were dried and weighed. The percentage yield of each plant was calculated as per standard method. The weighed extract of each plant drug was stored in desiccators for further use. The yield was found to be (8.62% w/w of crude drug) of hydroalcoholic extract with semisolid mass of *Aerva lanata*. Obtained results were recorded in table. From the results obtained it is clear that the *Aerva lanata* plant shows the presence of flavonoids, proteins, carbohydrates, phenol and saponins were found in *Aerva lanata* when extracted using maceration procedure. The phytochemical analysis of *Aerva lanata* plant indicates the presence of carbohydrates, flavonoids, diterpenes, saponins, proteins and phenols present in sufficiently enough quantity according to preliminary phytochemical analysis.

Gallic acid is used as a standard compound and the total phenols were expressed as mg/100mg gallic acid equivalent using the standard curve equation: $y = 0.018x + 0.016$, $R^2 = 0.998$, Where y is absorbance at 765 nm and x is total phenolic content in the hydroalcoholic extract of *Aerva lanata*. The results were expressed as the number of equivalents of Gallic acid (mg/100mg of extract). Flavonoids content was calculated

from the regression equation of the standard plot y = 0.029x - 0.004, R^2 =0.999) and is expressed as quercetin equivalents (QE) (fig. 7.2). Total flavonoids content was 0.685mg/100mg quercetin equivalent in hydroalcoholic extract of *Aerva lanata*. Flavonoids are the most common and widely distributed group of plant's phenolic compounds.

The hydroalcoholic extract of *Aervalanata*exhibited dose dependent antipyretic activity at 2, 3 and 4 hours and at dose 250 mg/kg significantly reduced the rectal temperature at 3 hour and at dose 350 mg/kg significantly reduced rectal temperature at 2, 3 and 4 hours in comparison with vehicle control.

Table 1: Extractive values obtained from *Aervalanata*

S. No.	Solvent	Time of extraction	% Yield
1.	Hydroalcoholic extract	48 hours	8.62%

Table 2: Preliminary phytochemical screening of *Aervalanata*

S. No.	Phytoconstituents	Test Name	Hydroalcoholic extract
1	Alkaloids	Hager's Test	Absent
2	Glycosides	Legal's Test	Present
3	Carbohydrates	Fehling's Test	Present
4	Flavonoids	Lead acetate	Present
5	Diterpenes	Copper acetate Test	Absent
6	Saponins	Froth Test	Present
7	Proteins	Xanthoproteic Test	Present
8	Phenols	Ferric Chloride Test	Present

Table 3: Estimation of total phenolic and flavonoids content of *Aervalanata*

S. No	Extract	Total phenol content (mg/100mg of dried extract)	Total flavonoids content (mg/ 100 mg of dried extract)
1	Hydroalcoholic	0.374	0.685

Table 4: Effect of hydroalcoholic extract of *Aervalanata*on rectal temperature in different time intervals

Groups	Treatments	Dose (mg/kg rat b.wt.)	Rectal Temperature in °C after treatment			
			1 hour	2 hour	3 hour	4 hour
Group I	Water for Injection (WFI)	0	39.14± 0.15	39.19± 0.11	38.96± 0.09	38.77± 0.18
Group II	Paracetamol	150	38.44± 0.17	38.07± 0.19**	37.86±0 .14***	37.62±0 .11***
Group III	Hydroalcoholic extract of *Aervalanata*	250	38.92± 0.23	38.49± 0.25	38.28± 0.23*	38.19± 0.23
Group IV	Hydroalcoholic extract of *Aervalanata*	350	38.71±0 .22	38.39± 0.18*	38.14± 0.17*	37.82± 0.18**

Conclusion

When tested on rats with brewer's yeast-induced hyperthermia, the hydroalcoholic extract of *Aervalanata* revealed the presence of significant bioactive components such

phenols and flavonoids, and shown anti-pyretic action at various dose levels. According to the study, hydroalcoholic *Aervalanata* (leaves) may contain bioactive chemicals that might be exploited to develop medications to treat antipyretic action.

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