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Antipyretic and Diuretic Activity of *Ammania baccifera*

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Abstract – In the present study the whole plant of *Ammania baccifera* Linn was extracted with petroleum ether, chloroform, ethyl acetate and ethanol. The extracts were vacuum dried to yield the respective petroleum ether (PEE), chloroform (CE), ethyl acetate (EAE) and ethanol extracts (EE). PEE, CE, EAE and EE were evaluated for their antipyretic and diuretic activity at 200 mg/kg dose level. Significant antipyretic activity was associated with PEE, CE, EAE and EE. CE was found to exhibit higher antipyretic activity as paracetamol at 100 mg/kg dose level. Significant diuretic activity was exhibited by EAE, EE and PEE. The present study supports the claims of *Ammania baccifera* mentioned in the Indian system of medicine.
Keywords – antipyretic, diuretic, *Ammania baccifera*

Introduction

Ammania baccifera (Blistering Ammania) (Variers, 1998) is a traditional herbal remedy with an ancient history and a world wide usage belonging to the family *Lythraceae* (Kirthikar and Basu, 1975). The leaves are acrid and are used in the treatment of rheumatic pains and fever. They are also prescribed as stomachic and laxative. The fresh bruised leaves are used as rubifacient and external remedy for ringworm and other skin infections. The leaves and the ashes of the plant are mixed with oil and applied to cure herpetic eruptions (Anonymous, 1985). The herb is reported to posses antityphoid and anti tubercular properties (Ambasta, 1986). The herb contains Vitamin C (Anonymous, 1948). Roots contain betulinic acid and lupeol (Thakkar 1986). Leaves contain ellagic acid and quercetin . In the present study ethanol, ethyl acetate, chloroform and petroleum ether extracts of the herb were investigated for their antipyretic activity by yeast induced pyrexia method. The parameters evaluated were mean rectal temperature. The extracts were also investigated for their diuretic activity. The urine volume and electrolyte (Na^+) content were estimated.

Materials and Methods

Plant material and extraction – *Ammania baccifera* herb was collected from surrounding areas of Vallam, Tirunelvelli District, Tamil Nadu and dried at room temperature. The voucher specimen was identified and kept in Department of Pharmacognosy Vels College of Pharmacy Chennai. The dried and coarsely powdered whole plant material was extracted by successive maceration with solvents like petroleum ether, chloroform, ethyl acetate and ethanol for 24 hours at room temperature (Pulok, 2002). The extracts were vacuum dried using rotary vacuum flash evaporator to yield solid residue of the respective extracts petroleum ether (PEE), Chloroform (CE), ethyl acetate (EAE) and ethanol extract (EE). The vacuum dried extracts were used for anti-pyretic and diuretic activity.

Animals – Wistar albino male rats (150-200 g) were obtained from the animal house department of the institution. They were housed in polypropylene cages at 25±2°C relative humidity of 45-55%, maintained under 12 hr light and dark cycles. The animals were fed with standard animal feed (Hindustan Lever Ltd.) and water *ad libitum*. All the animals were acclimatized for a week before use. PEE, CE, EAE and EE were suspended in 0.5% carboxy methyl cellulose (CMC) and administered to the animals.

Antipyretic activity – Antipyretic activity of the extracts were evaluated by Brewers yeast induced pyrexia method (Pulok *et al.*, 1996) using wistar albino male rats selected by random sampling technique. All the animals were divided into six groups, each group containing six animals. Pyrexia was produced by injecting 2 ml of 15% suspension of Brewers yeast subcutaneously. Paracetamol 100 mg/kg

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Table 1. Antipyretic activity (Yeast induced pyrexia method) of *Ammania baccifera* plant extracts

Treatment	Dose (mg/kg)	Mean decrease in temperature (°C) ± SEM (n=6) Time after drug administration.		
		90 min	180 min	270 min
PEE	200	0.48 ± 0.04[a]	1.38 ± 0.11[a]	1.93 ± 0.08[a]
CE	200	1.43 ± 0.09[a]	1.85 ± 0.09[a]	2.51 ± 0.13[a]
EAE	200	0.46 ± 0.04[a]	1.41 ± 0.19[a]	1.76 ± 0.09[a]
EE	200	0.35 ± 0.02[a]	0.90 ± 0.08[a]	1.71 ± 0.13[a]
Paracetamol	100	1.14 ± 0.03[a]	1.98 ± 0.13[a]	2.20 ± 0.20[a]
Control	0.5%CMC	0.10 ± 0.02	0.13 ± 0.06	0.21 ± 0.08

Significance level :[a]P<0.001 compared to control.

was administered as a standard drug. All the extracts were administered orally at a dose level of 200-mg/kg p.o after 20 h of yeast administration. The rectal temperature was recorded at 90 min, 180 min and 270 min after treatment. The difference between the mean rectal temperature of the control group and that of the other groups were calculated. The antipyretic activity data are presented in Table 1.

Diuretic activity – Male albino rats having average body weight of 175-225 gm were divided into six groups having six animals in each group. All the animals were fasted overnight and received a priming dose of normal saline (25 ml/kg.) orally 1 hour prior to sample administration. Animals were placed in metabolic cages, extreme care was taken to avoid contamination of urine with faecal matter (Turner, 1965; Anbalagan *et al.*, 2002). The extracts were administered at a dose of 200 mg/kg orally by gavage. Frusemide at the dose of 10 mg/kg, i.p, served as the standard. Urine was collected up to 24 h, after administration of the extracts. At the end of the 4th h and 24th h, urine volume was measured and electrolyte (Na^+) estimation was done on a flame photometer. The diuretic activity data are presented in Table 2.

Statistical analysis – All data were expressed as mean ±SEM. Unpaired student-t-test (Spiegel and Meddis, 1980) was used for the statistical analysis. $p<0.05$ was regarded as statistically significant.

Results and Discussion

Various extracts of the *Ammania baccifera* at 200-mg/kg-dose level exhibited significant antipyretic activity ($p<0.001$) (yeast induced pyrexia method). CE was found to exhibit higher antipyretic activity compared to paracetamol at 100 mg/kg dose level after 270 minutes of drug administration.

It was observed that EAE, EE, exhibited significant diuretic activity ($p<0.001$). But in PEE significant level was found only at 24th h. CE was completely devoid of diuretic activity at the experimental dose.

Frusemide is a highly effective and rapidly acting diuretic. It causes acute changes in renal and systemic haemodynamics in addition to its prominent tubular action. The intrarenal haemodynamic changes of frusemide are brought about by increased local prostaglandins synthesis. Prostaglandins increase the excretion of water, sodium and potassium and have a diuretic effect. PGE_2 antagonizes ADH action and adds to the diuretic effect. They also cause renal vasodilatation and inhibit tubular reabsorption (Tripathi, 2001). Hence like frusemide the diuretic effect of PEE, EAE and EE may be due to the local prostaglandins synthesis. One of the side effects of prostaglandins is fever but the intensity varies with the PG, the dose and the route (Tripathi, 2001). PGE_2 produce fever when infused into the cerebral ventricles or when injected into the hypothalamus (Goodman and Gilman, 1996). The PEE, EAE, and EE of *A.baccifera* also has antipyretic activity and hence the prostaglandins produced locally which may be responsible for the diuretic effects of these extracts do not interfere with or may not be certainly effective in producing pyrexia, when these extracts are administered orally instead of injecting into the hypothalamus. There is also evidence that contradicts the hypothesis that PGE_2 produces fever (Goodman and Gilman, 1996). Hence the antipyretic activity of PEE, EAE and EE may also be due to the contradictory effect of prostaglandins in the CNS.

Moreover CEE was found to exhibit higher antipyretic

Table 2. Diuretic activity of *Ammania baccifera* plant extracts

Treatment	Dose (mg/kg)	Urine volume Mean (ml) ± SEM(n=6)		Urine electrolyte(Na^+) MEq / l Mean ± SEM(n=6)	
		4^{th} h	24^{th} h	4^{th} h	24^{th} h
PEE	200	1.40 ± 0.17	5.33 ± 0.17[c]	115.72 ± 7.20	365.0 ±11.20[d]
CE	200	2.03 ± 0.32	5.07 ± 0.19	120.66 ± 4.52	283.60 ± 2.43
EAE	200	4.50 ± 0.14[c]	6.17 ± 0.15[d]	383.33 ± 2.34[d]	483.33 ± 12.53[d]
EE	200	4.31 ± 0.23[b]	5.90 ± 0.19[d]	271.66 ± 15.9[d]	430.00 ± 11.20[d]
Frusemide	10	5.10 ± 0.13[d]	5.00 ± 0.12[a]	705.00 ± 6.25[d]	826.67 ± 9.83[d]
Control	0.5%CMC	3.33 ± 0.24	4.27 ± 0.24	118.33 ± 7.24	281.67 ± 6.52

Significance level: [a]p<0.05, [b]p<0.02, [c]p<0.01 and [d]p<0.001 compared to control.

activity, which may be due its inhibitory action of prostagladins biosynthesis and hence was completely devoid of diuretic activity.

The diuretic and antipyretic activity of these extracts may also be due to the effect of one or a combination of the bioactive components in these extracts. Further studies shall aim at isolating, purifying and characterizing the compounds in these extracts responsible for antipyretic and diuretic activities.

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