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Evaluation of Diuretic Activity of Different Extracts of *Mimosa pudica* Linn.

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Abstract: In that study, *Mimosa pudica* linn was tested for diuretic activity using the lipschitz test. The ethanolic and aqueous extract of *Mimosa pudica* Linn. was studied at two dose level 100 and 200 mg kg⁻¹ b.wt. Furosemide (20 mg kg⁻¹ b.wt.) was used as standard drug in a 0.9% saline solution. Urine volumes were measured for all the groups up to 5 h. The ethanolic extract of *Mimosa pudica* linn was exhibited significant diuretic activity at doses of 100 and 200 mg kg⁻¹ b.wt. by increasing total urine volume and ion concentration of Na⁺ k⁺ and Cl⁻.

Key words: Diuretic activity, flame photometry, lipschitz test, *Mimosa pudica* Linn

INTRODUCTION

Drugs that induce diuresis (enhances urine outflow) are known as diuretics (Agrawal and Paridhavi, 2007). Diuretics are used to relieve from hypertensive diseases and they are also used to treat peripheral edema and pulmonary congestion suffered patients by reducing cardiac pressure (Plasma volume and blood pressure) and cardiac overloading (Jain *et al.*, 2007). In traditional system of medicine many herbal drugs are used to treat renal disorders and they have considerable diuretic activity. And it has been confirmed by experimental animals (Lahlou *et al.*, 2007). Presently many diuretics like mannitol, thiazides, frusemide, ethacrinic acid are used in practice but still there is a need of more effective and less toxic diuretic agent. Several herbal drugs have been proved that they have ability to treat renal diuresis but they have not investigated in a manner. Several plants have major ability to treat diuretic activity, some of them are *Boerhaavia repens*, *Boerhaavia rependa*, *Tribulus terrestris*, *Dendrophthoe falcate*, *Saccharum officinarum*, *Butea frondosa* and *Boerhaavia diffusa*.

The reasons for choosing *Mimosa pudica* are easy availability and wide geographical distribution globally in almost every climatic condition. The present study is proposed to evaluate and compare the diuretic activity of aqueous and ethanolic extracts of *Mimosa pudica* Linn. in albino wistar rats.

MATERIAL AND METHODS

Plant material: The plant material was collected from A.V.S. botanical garden, Selum (Tamilnadu). The plant

material was authenticated by Prof. P. Jayaraman (Director), National Institute of Herbal Science, (Plant Anatomy Research Centre). The specimen (PARC/2008/210) was deposited in the museum of Department of Pharmacognosy, Padmavati College of Pharmacy, Dharmapuri, Tamilnadu, India.

Drug and chemicals: All the drugs, chemicals and reagents were procured from the central drug store of Padmavati College of Pharmacy, Dharmapuri, Tamilnadu, India. All the chemicals were used of an analytical grade.

Method of extraction: The whole plant were coarsely powdered, weighed and extracted by Soxhlet apparatus. The dried powdered plant material was defatted with pet. ether at 60-80°C by soxhlet apparatus for 72 h. Then pet. ether extract was dried and collected. Then the mark was dried and successively extracted with ethanol and water each for 72 h. Then the extracts were filtered and solvents were removed by distillation under reduced pressure (Kokate *et al.*, 2006; Khandelwal, 2006).

Animals: Adult Albino rats of either sex weighing 150-200 g bred in the animal house of the Padmavati College of Pharmacy, Dharmapuri, Tamilnadu, India and were housed in a controlled room with at room temperature of 22±02°C, humidity 30-60% and kept on standard pellet diet (altromin pellets) and water *ad libitum*. Animal maintenance and handling were in accordance to internationally accepted standard guidelines for use of laboratory animals. Animals kept under fasting for overnight, but allowed for free access of water before commencement of experiments. The experiment were conducted according to the guidelines

and ethical norms, approved by Ministry of Social Justice and Empowerment, Government of India and the study was got approved from the Institutional Animal Ethical Committee (IAEC) and the No. is CPCSEA/265 of committee for the purpose of control and supervision of experiments on animals (CPCSEA).

Acute toxicity studies: The acute toxicity study was carried out in adult albino rats by “fix dose” method of OECD (Organization for Economic Co-operation and Development) guideline No. 420. (Fixed dose method of annex 2d). The animals were fasted overnight and next day extracts of *Mimosa pudica* linn were administered orally at dose level 2000 mg kg⁻¹ each. Then the animals were observed continuously for 3 h for general behavioral, neurological, autonomic profiles and then in every 30 min and finally for mortality after 24 h till 14 days. The observations were tabulated according to ‘Irwin’s Table’ and from results suitable doses were selected for further experimentation (Vogel, 2002; OECD, 2001; Ghosh, 2005).

Diuretic activity (lipshitz test): The lipshitz test was employed for the assessment of diuretic activity on 18 rats, divided in 6 groups, each rat weighing 150-200 g and they were fasted and deprived of water for 18 h prior to the experiments. On the day of experiment all animals were given normal saline orally 25 mL kg⁻¹ b.wt. Immediately after administration of the test and standard doses, the animals were placed in metabolic cages (three animals in each metabolic cage) and urine was collected in measuring cylinder up to 5 h. During this period no food and water was given to the animals (Bose *et al.*, 2006; Pagar *et al.*, 2007; Koti and Purnima, 2008; Jesupillai *et al.*, 2008). Then volume of urine and concentration of Na⁺, K⁺ and Cl⁻ were estimated for assessing diuretic activity. The concentrations of Na⁺ and K⁺ were determined by flame photometer and concentration of Cl⁻ was estimated by titration with silver nitrate solution (0.17 N) using 2 mL of ferric alum solution as indicator (Pattabiraman, 1998).

Grouping of animal:

Group 1: Treated with normal saline

Group 2: Treated with ethanolic extract of *M. pudica* Linn. (100 mg kg⁻¹)

Group 3: Treated with ethanolic extract of *M. pudica* Linn. (200 mg kg⁻¹)

Group 4: Treated with aqueous extract of *M. pudica* Linn. (100 mg kg⁻¹)

Group 5: Treated with aqueous extract of *M. pudica* Linn. (200 mg kg⁻¹)

Group 6: Treated with furosemide (20 mg kg⁻¹)

Statistical analysis: Values are expressed as Mean±SEM. Statistical Difference in mean were analyzed using one way ANOVA followed by Dunnett’s test p<0.05 was considered significant.

RESULTS AND DISCUSSION

Diuretics are used for relieving by pulmonary congestion and peripheral edema. These agents are useful for reducing the volume overload, orthopnea and paroxysmal nocturnal dyspnea. They decrease plasma volume and subsequently venous return to the heart. Due to this they decrease cardiac workload, oxygen demand, plasma volume and blood pressure. Thus, diuretics play an important role in the treatment of hypertensive patients (Lahlou *et al.*, 2007). The diuretics are used in the treatment of edema, so they have shown effectiveness in the presence of electrolyte and water. Thus, excess water and electrolyte were simulate the edema (Nedi *et al.*, 2004). During acute toxicity studies no mortality was seen till the end of 14 days study of toxicity. And both plant extracts (ethanolic and aqueous) were not shown the diuretic activity and urine output at the dose of 100 mg kg⁻¹ b.wt. But it was shown significant (p<0.05) diuretic activity at the dose of 200 mg kg⁻¹ b.wt. Both plant extracts (ethanolic and aqueous) were significantly (p<0.05) increased the urine volume and concentration of Na⁺, K⁺ and Cl⁻ in urine when compared with control group (Table 1, Fig. 1 and 2). Furosemide is a widely used diuretic in clinical practices as standard drug for compare the pharmacological response.

The mechanism of action of diuresis by ethanolic and aqueous extracts of *Mimosa pudica* linn were compared with the furosemide which is a high ceiling loop diuretics. The diuresis has two main components: increase in urine volume (water excretion) and a net loss of electrolytes from the body. This process results, suppression of renal tubular re-absorption of water and electrolytes in the

Table 1: Effect of oral administration of aqueous and ethanolic extracts of *Mimosa pudica* linn on urine volume and electrolytic concentration

Treatment	Dose	Urine volume (mL)	Na ⁺ ME (q Lt ⁻¹)	K ⁺ ME (q Lt ⁻¹)	Cl ⁻ ME (q Lt ⁻¹)
Control	25 (mL kg ⁻¹)	2.32±0.05	84.2±2.30	81.7±.9400	81.2±1.30
Ethanolic extract	100 (mg kg ⁻¹)	2.52±0.18	109.2±6.30	81.7±0.220	81.7±4.40
Ethanolic extract	200 (mg kg ⁻¹)	3.23±0.27*	115.6± 8.5*	87.4±0.330*	94.21±7.2*
Aqueous extract	100 (mg kg ⁻¹)	2.24±0.05	105.0±1.42	81.3± 0.66	81.1±1.33
Aqueous extract	200 (mg kg ⁻¹)	3.17±0.06*	113.3±9.30*	87.5±4.100*	88.22±6.7*
Furosemide	20 (mg kg ⁻¹)	3.85±0.06*	139.5±0.14*	98.6±1.77*	94.0±1.32*

n = 6 *p<0.05 v/s Normal control, Value expressed in Mean±SEM (student t-test)

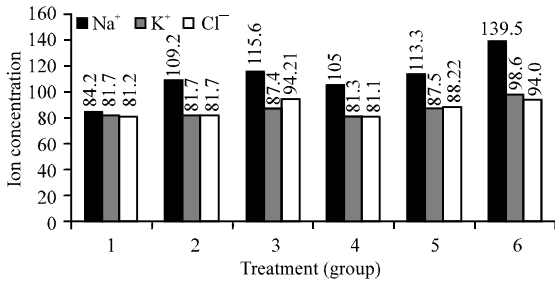


Fig. 1: Diuretic activity (Ion concentration) of ethanolic and aqueous extracts of *Mimosa pudica* Linn.

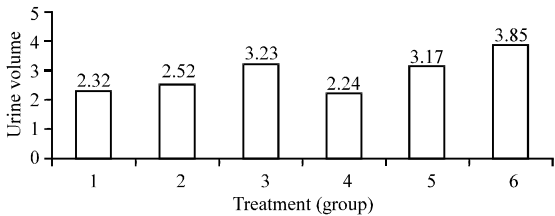


Fig. 2: Diuretic activity (Urine volume) of ethanolic and aqueous extracts of *Mimosa pudica* Linn.

blood stream. The furosemide, increases urinary concentration of Na⁺ and urine volume by inhibiting Na⁺/K⁺/2Cl⁻ co-transporter system in the thick ascending limb of the loop of henley while thiazide diuretics inhibit the Na⁺/K⁺/2Cl⁻ symporter system in the distal convoluted tubule, by competing for the Cl⁻ binding site and increased the excretion of Na⁺ and Cl⁻ (Jain *et al.*, 2007).

CONCLUSION

In conclusion, we conclude that the ethanolic and aqueous extracts of plant *Mimosa pudica* Linn. have significant effects on urinary excretion of electrolytes at higher doses and support the claim of diuretic efficacy of plant.

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