Asian Journal of Chemistry Vol. 19, No. 6 (2007), 4459-4462

Diuretic Activity of *Sida cordifolia* Linn. of Nilgiris

T. PRABHAKAR*, K. RAMESH, P.K.M. NAGARATHNA, T. SREENIVASA RAO, K. LAKSHMAN† and B. SURESH‡
Department of Pharmacognocy, Karnataka College of Pharmacy, 33/2, Thirumenahalli Hegdenagar Main Road, Bangalore-560 064, India
(M) 09358376856; E-mail: prabhakar_cog@hotmail.com

The diuretic properties of petroleum ether, chloroform, ethyl acetate and methanol extract of roots of *Sida cordifolia* Linn. were evaluated by determination of urine volume, electrolyte concentration and diuretic potency in male albino rats. Different concentrations of petroleum ether, chloroform, ethyl acetate and methanol extract (250, 500 mg/kg) were orally administered to hydrated rats and their urine out put was immediately measured after 5 h of treatment. Furosamide (10 mg/kg) was used as reference drug while normal saline (0.9%) solution was used as control. All the extracts except petroleum ether extract exhibited dose dependent diuretic property. The onset of diuretic action was extremely prompt (within 1h) and lasted through out the studied period (upto 5 h). The chloroform, ethyl acetate, methanol extracts caused marked increase in Na^+, K^+ and Cl^- level. The result of this experiment suggests that *Sida cordifolia* Linn. root extracts possessed significant diuretic activity in rats.

Key Words: Diuretic activity, *Sida cordifolia* Linn., Chloroform, Ethyl acetate, Methanol extracts.

INTRODUCTION

Sida cordifolia Linn. is a plant belonging to family malvaceae is shrubby, branched, softly, hairy and with much stellate hair nearly all over and subpersistent. It is distributed in tropical and subtropical regions of both hemispheres[1]. This family contains 75 genera and about 1000 species in tropical and temperate ranges. The plant is found predominantly in two regions of the country, the regions are Gharwal in Himalayas and in Western Ghats of niligiris. The plant is slightly bitter, sweet, tonic, astringent, emollient, aphrodisic, removes vata and pitta. The bark cures urinary troubles and discharges.The seeds are reckoned aphrodisic and are administered in gonorrhoea. The roots of all these species are regarded as cooling, astringent, stomachic, tonic, aromatic, bitter, febrifuge, demulcent and diuretic[2]. It also reported as antiinflammatory, antipyretic[3] antifungal and

†J.S.S. College of Pharmacy Rocklands, Ootacamund-643 001, India.
‡P.E.S. College of Pharmacy, Hanumanthnagar, Bangalore-560 050, India.

antiyeast activity[4], antifertility[5], antispasmodic and hypotensive[6], antifilarial[7] activity. The methanolic extract of *Sida cordifolia* plant was investigated for antibacterial activity[8] on different organisams. Leucosal H a marketed formulation consists of an ingradient of *Sida cordifolia* was carried out a clinical study of this herbal preparation in case of leucorrhoea[9]. Earlier the phytochemical studies of its roots have shown the presence of ephedrin, ψ ephedrine, vasicinol, vasicinone and N-methyl tryptophan[10] and presence of fatty acid esters, β sitosterol, higher fatty acids including steric acid and palmitic acid[11]. It is also reported the presence of flavonoids and saponins[12] in roots of the plant *Sida cordifolia* Linn. on preliminary examination of whole plant shows the presence of alkaloids and quantitative examination shows their occurrence to the extent of 0.085 %[13]. The polarographic studies indicated that the concentration of ephedrine in perchloric acid extract of air dried stem and roots of *Sida cordifolia* to be 1.86 and 1.64 %, respectively[14]. The present study was undertaken to investigate its potential diuretic activity using albino rats as a model.

EXPERIMENTAL

The fresh roots of *Sida cordifolia* Linn. were collected in the month of July in Kallar, a small hamlet in the district of Nilgiris. The plant was identified by the botanist of Government Arts College, Ooty. The voucher specimen (SCL-5) was submitted department of Pharmacognocy, J.S.S. College of pharmacy, Ooty.

Preparation of extracts: The plant materials were cleaned to make it free from solid debris. They were dried at room temperature and reduced to fine powder to particle size 60 mesh size and then subjected to continuous hot extraction with petroleum ether, chloroform, ethyl acetate, methanol in soxhlet extractor for 48 h[15].

The individual extracts were collected and concentrated by evaporation in vacuum. The dried extracts were formulated as suspension using normal saline as a vehicle. Various extracts of each plant material were evaluated for their diuretic activity.

Animals used: Male albino rats weighing 125 to 150 g bred in our laboratory were used for the study. The animals were housed and acclimatized under standard laboratory conditions and were supplied with standard laboratory feed and water was supplied *ad libitum*. The animals were divided into 6 groups consisting of 6 animals each, the entire experimental model 1 to 4 served as petroleum ether, chloroform, ethyl acetate and methanol, while 5 and 6 received +ve control and solvent control, respectively. All the experiments were carried out under the guidance of ethical committee of J.S.S. College of pharmacy (Registration CPCSEA/ CH/ CRG/ 2001/ Ooty).

Toxicological studies: Preliminary oral LD_{50} doses of petroleum ether, chloroform, ethyl acetate and methanol extracts of *Sida cordifolia* Linn. in mice were found to be 400 mg/kg, respectively.

Evaluation of diuretic activity: The method of Lipschitz *et al.*[16] was employed for the assessment of diuretic activity. The male albino rats weighing between 125 to 150 g were procured from central animal house of J.S.S. College of pharmacy, Rocklands, Ooty. The animals were maintained under standard conditions of temperature and humidity. The animals were divided into 6 groups consisting of 6 animals each were hydrated with 5 mL/kg of water orally prior to drug/extract administration Normal saline (0.9 %) and furosamide (10 mg/kg) served as control and standard drug, respectively. 250 mg and 500 mg/kg of petroleum ether, chloroform, ethyl acetate and methanol extracts of *Sida cordifolia* Linn. were administered orally to animals in each group. Immediately after dosing the rats were placed in metabolic cages specially designed to separate urine and faeces and kept at room temperature. The urine was collected in measuring cylinder upto 5 h after dosing. During this period no food or water was made available to the animals. The urine volume was measured with graduated measuring cylinder. The parameters taken were total urine volume, urine concentration of Na^+, K^+ and Cl^-. Concentration of Na^+ and K^+ was determined with flame photometer while Cl^- concentration was estimated titrimetrically. The mean urine volumes were determined and diuretic potency was assessed by comparison of urine excretion due to the extracts with respect to the standard drug Furesamide.

Statistical analysis: All values are shown as mean SEM. The results were statically analysied using one-way Anova followed by Dunnett's test. $p \leq 0.01$ was considered significant.

RESULTS AND DISCUSSION

Preliminary phyto chemical screening indicated the presence of Alkaloids, Phyto sterols, Flavonoids and Saponins. The results of diuretic activity of *Sida cordifolia* Linn. presented in Table-1, shows that all the extracts except petroleum ether extract are active and displayed dose dependent diuretic activity.

The present study indicates that the chloroform, ethyl acetate and methanol extracts of *Sida cordifolia* Linn. root at doses of 250 and 500 mg/kg caused dose dependent diuretic activity. At the concentration of 250 mg and 500 mg/kg, the chloroform, ethyl acetate, methanol extracts gave a mean urine volume of 1.95 ± 0.75, 20.24 ± 0.12 and 1.67 ± 0.46 after 5 h, respectively. The chloroform, ethyl acetate and methanol extracts (250 mg and 500 mg/kg) produced urine with Na^+, K^+ and Cl^- content of 89.3 ± 1.22, 100.7 ± 1.25, 107.0 ± 0.75, 120.2 ± 2.46, 150 ± 2.75, 180 ± 3.2, 88.8

± 0.6, 78.0 ± 0.7, 120.5 ± 1.18 of Na^+, K^+ and Cl^-, respectively. The diuretic potency of *Sida cordifolia* Linn. extracts was dose dependent (Table-1).

TABLE-1
DIURETIC ACTIVITY OF *Sida cordifolia* L. ROOT EXTRACTS

Extract/ Drug	Dose (mg/kg)	Mean urine volume	Diuretic potency	Electrolyte concentration		
				Na^+	K^+	Cl^-
Petroleum ether	250	1.50 ± 0.25	0.54	72.3 ± 1.28	90.3 ± 0.75	95.7 ± 1.25
Chloroform	500	1.95 ± 0.75	0.85	89.3 ± 1.22	100.7 ± 1.25	107.0 ± 0.75
Ehylacetate	250	20.24 ± 0.12	1.01	120.2 ± 2.46	150.0 ± 2.75	180.0 ± 3.20
Methanol	500	1.67 ± 0.46	0.67	88.8 ± 0.60	78.0 ± 0.70	120.5 ± 1.18
Furosamide	10	2.45 ± 0.56	1.00	126.0 ± 1.40	105.6 ± 1.30	152.0 ± 0.90
Normal saline (mL/kg)	5	0.84 ± 0.37	0.32	90.3 ± 1.56	62.3 ± 0.75	105.6 ± 0.41

Values (except diuretic potency) are mean ± SEM (n = 6). * $p \leq 0.01$ (Anova followed by Dunnett's test) compared with control. Diuretic potency is a ratio of urine volume due to tested drug to that of standard drug.

On the basis of above results, it can be concluded that the Nilgiris region of *Sida cordifolia* Linn. root extracts produced significant diuretic effect with increase in electrolyte concentration in urine.

However, further studies are necessary to identify and isolate the active constituents responsible for its diuretic activity and also there is a need to elucidate its mechanism of its diuretic action.

REFERENCES

1. K.R. Kirtikar and B.D. Basu, Indian Medicinal Plant, International Book Publishers, Dehradun, Vol. 1, p. 312 (1999).
2. A.K. Nadkarni, Indian Materia Medica, Popular Prakashan Pvt. Limited, Mumbai, Vol. 1, p. 1135 (1982).
3. M. Alam and S. Joy, *Indian Drugs*, **28**, 397 (1991).
4. A.N. Sawhney and M.R. Khan, *Pak. J. Scient. Ind. Res.*, **21**, 193 (1978).
5. R.R. Chaudhury and V. Gupta, *Bull. Med. Ethanobot. Res.*, **1**, 420 (1980).
6. M.L. Dhar and M.M. Dhar, *Indian J. Exp. Bio.*, **6**, 232 (1968).
7. J.C.W. Comley and V.P.K. Titanji, *Acta Leidensia*, **59**, 361 (1990).
8. Y. Boily and L. Van Puyvelde, *J. Ethano. Pharmacol.*, **16**, 1 (1986)
9. G. Mukherjee and S. Banerjee, *Calcutta Med. J.*, **86**, 133 (1989).
10. A.A.L. Gunatilaka, S. Sotheeswaran, A.I. Chandrasekara and H.T. Badrasriyani, *Planta Med.*, **39**, 66 (1980).
11. M.W. Khan and M.A. Rashid, *J. Bangladesh Acad. Sci.*,**13**, 55 (1989).
12. S.K.P. Sinha and J.V.V. Dogra, *Int. J. Crude Drug Res.*, **232**, 77 (1985).
13. R.N. Chopra and D.E. Premankur, *Indian J. Med. Res.*, **18**, 469 (1930).
14. A Begerhotta and N.R. Bannerjee, *Current Sci.*, **54**, 690 (1985).
15. J.B. Harbone, Phytochemical Methods, Chapman & Hall, London, p. 90 (1973).
16. W.L. Lipschitz, Z. Hadidian and A. Kerpscas, *J. Pharmacol. Exp. Therp.*, **79**, 97 (1943).

(*Received*: 2 June 2006; *Accepted*: 21 April 2007) AJC-5579