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DIURETIC, CNS DEPRESSANT AND LAXATIVE EVALUATION OF THE LEAF EXTRACT OF *SESBANIA GRANDIFLORA*

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ABSTRACT

Diuretic, CNS depregaant and laxative effect of the leaf extract of *Sesbania grandiflora* was evaluated by Lipschitz method, Actophotometer and Charcoal meal test, respectively. The leaf extract caused significant increase in the urine output and excretion of sodium and potassium. Decrease in locomotor activity of mice was observed after the administration of the leaf extract. The leaf extract also showed a promising laxative activity. Diuretic, CNS depressant and laxative activity elicited by the leaf extract of *sesbania grandiflora* was evaluated by student "t" test.

INTRODUCTION

Sesbania grandiflora (Family : Leguminosae) is a native of Malaysia and is grown in many parts of India such as Punjab, Delhi, Bengal, Assam, Tamilnadu and Andaman. Tender leaves, rods *and* flowers are eaten as vegetables. They are commonly cultivated for green manure and fodder and as temporary shades and wind breaks. Literature survey on photochemical investigation reveals the presence of vitamines, pectin, amino acids and trace elements in leaves. Anti-inflammatory activity was reported for *the* flowers of *Susbania grandiflora*[1]. Leaves of *Sesbania grandiflora* was reported to contain non-poisonous saponin like substances, which on hydrolysis yield oleanolic acid, galactose, rhamnose and glucuronic acids[2]. The juices of the leaves are used in nasal catarrh and head-ache[3,4]. Leaves are regarded in the treatment of sour mouth and to disinfect the mouth[5]. In traditional medicines the crude extract of the leaves are reported to possess CNS depressant, antihypertensive activity, diuretic and laxative activity[6].

Based on these traditional uses of the leaves as diuretic, CNS depressant anl laxative activity, the present study was undertaken with an objective to scientifically validate the claim.

EXPERIMENTAL

Preparation of the laef extract : Fresh leaves of the plant *were* collected and authenticated at the taxonomical division of Bishop Heber college, Tiruchirappalli by Dr. Mathews. A voucher specimen of the leaf has been preserved in our herbarium. The leaves were washed with water and shade dried for 10 days. The dried leaves were powdered using a pulveriser and passed

through No. 40 mesh sieve. 500 g of the powdered and sieved leaf material was extracted with 2 L of methanol (Ranbaxy, India) for 48 h using a Soxhlet extractor. The extract obtained was evaporated *under* vacuum to remove the solvents completely. (Extract obtained = 11.95 g.)

Diuretic activity : The method of Lipschitz *et al.*[7,8] was employed for the assessmet of diuretic activity. Male wistar rats each weighing, 140 - 170 g was fasted and deprived of water for 18 h prior to the experiment. On the day of experiment, animals were divided into six groups of six each. The first gruop of animal was given saline orally (25mL/kg) body weight, The second, third, fourth and fifth group animals were given leaf extract orally in the dose of 30, 60, 90, 120 mg/kg, respectively.

The last group of animals were given standard diuretic frusemide orally (2 mg/kg). Immediately after the dosing the rats were placed in the metabolic cages (Techniplast Gazada, Italy) specially designed to separate urine and faces and kept at room temperature at 25 ± 0.5°C. The urine was collected in the measuring cylinder upto 5 h after dosing. During this period, no food or water was made available to animals. The total volume of urine collected was measured for both control and treatment groups. Urine samples were analyzed thereafter for Na^+ and K^+ concentration by flame photometer method (Systronics) and concentration of Na^+ and K^+ excreted in the urine are tabulated in Table 1.

Table 1. Diuretic activity of methanolic extract of *Sesbania grandiflora* in rat.

Treatment	Dose (mg/kg)	Urine Volume (mL)	Electrolyte Excretion (M.eq)	
			Na^+	K^+
Saline	----	2.18 ± 0.20	0.69 ± 0.06	0.49 ± 0.03
Leaf extract	30	4.20 ± 0.46*	1.18 ± 0.15*	0.76 ± 0.08*
Leaf extract	60	7.2 ± 0.74**	3.06 ± 0.41**	1.40 ± 0.17**
Leaf extract	90	11.0 ± 1.33**	5.00 ± 0.72**	4.76 ± 0.46**
Leaf extract	120	14.2 ± 1.74**	8.11 ± 1.01**	7.06 ± 1.44**
Frusemide	2	21.30 ± 3.24**	16.2 ± 2.00*	27.0 ± 7.20*

**p < 0.001; *p < 0.01; Values are expressed as mean ± SEM : n = 6

CNS depressant activity : Healthy and adult male albino swiss mice weighing 20-30 g, fasted for 24 h prior to experiment, were divided into six groups of six animals each. The basal activity score for all the animals were recored and numbered. The graded doses of the methanolic extract of *Sesbania grandiflora* 30, 60, 90, 120 mg/kg was administered to the animals by i.p. route. The control group was given only saline 10 mL/kg, by i.p. route. One group of animals were administered i.p. with standard diazepam in a dose of 4 mg/kg. Scores were recorded after 30 minutes for all the animals and the percentage change in the activity was calculated by the following formula[9]

$$\% \text{ Change in locomotor activity} = \frac{A - B}{A} \times 100$$

where,
A = Basal score
B = Score after treatment
The results were tabulated in Table 2.

Table 2. CNS Depressant activity of methanolic extract of *Sesbania grandiflora* in mice.

Treatment	Dose (mg/kg)	Locomotor activity fo 10 minutes		% Change in activity
		Before tretatment	After treatment	
Saline	----	124**	126**	1.61
Leaf extract	30	185**	157**	15.13
Leaf extract	60	179**	142**	21.0
Leaf extract	90	165**	120**	28.0
Leaf extract	120	160**	103**	36.0
Diazepam	4	107**	42**	61.0

**p < 0.001; Values are expressed as mean : n = 6

Laxative Activity : Laxative activity of the leaf extract was investigated by gastric motility test using charcoal meal in mice. Swiss strain albino mice of either sex weighing 20-25 g were used for the study. The animals were divided into 3 groups of six mice each. All the groups of mice were administered orally with charcoal meal (10% w/v of animal charcoal in 2% w/v of tragacanth suspension). One group of the mice were administered orally with the leaf extract on a dose of 300 mg/kg body weight, 45 minutes before the charcoal meal. Another group of mice was administered with a standard drug sennoside (7.5 mg/kg. orally). After 15 minutes the animals were sacrificed and the abdomen was opened. The distance traveled by the charcoal meal was measured and the results are tabulated in Table 3.

Table 3. Effect of methanolic extract of *Sesbania grandiflora* on charcoal meal test in mice.

Treatment	Dose (mg/kg)	Distance traveled By charcoal	Movement of charcoal as (%)
Saline	----	4.65	18.4
Extract	300	13.20 ± 1.37**	52.8
Sennoside	7.5	18.0 ± 2.0**	72.0

* *p < 0.001; Values are expressed as mean ± SEM : n = 6

Statistical analysis : Results are expressed as mean + SEM and student's t- test was used to assess statistical significance.

RESULTS AND DISCUSSION

The methanolic extract of *Sesbania grandiflora* showed a marked increase in the urine volume output. The diuretic effect of the leaf extract was found to be dose dependent. The diuretic effet of the leaf extract was found to be less compared to the standard diuretic frusemide. Increase in the excretion of Na^+ and K^+ ions in the urine was observed after the administration of the leaf extracts of *Sesbania grandiflora.* Hence, it may have natriuretic and kaliuretic properties.

The results of locomotor activity are presented in Table 2. The animals treated with standard drug diazepam in a dose of 4 mg/kg. exhibited 61% reduction in the locomotor activity. The 30, 60, 90, 120 mg/kg doses of the crude extracts exhibited a reduction of 15.13, 21.00, 28.00 and 36 % of locomotor activity.

Comparison of the distance traveled by the charcoal meal in extract treated and control animals clearly reveals that the leaf extract exhibited a significant increase in the gastric motility of animals.

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