

Evaluation of Diuretic Activity of *Jussiaea Suffruticosa* Linn.

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Summary

The diuretic potential of methanolic extract of whole plant of *Jussiaea suffruticosa* was evaluated in male albino rats. The volume of urine, urinary concentration of sodium, potassium and chloride ions was the tested parameters of the study. Furosemide (100 mg/kg) was used as standard. Methanolic extract was tested in dose levels of 200 and 400 mg/kg. The methanolic extract at 400 mg/kg dose level produced very significant increase in volume of urine, urinary concentration of sodium, potassium and chloride ions (Na, K and Cl). However, 200 mg/Kg has not shown significant increase in all tested parameters. The methanolic extract showed the presence of alkaloids, steroids, flavonoids, tannins, carbohydrates and glycosides that may either individually or collectively possess natriuretic and diuretic activities.

Key Words: *Jussiaea suffruticosa*, diuretic, natriuretic, preliminary screening

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Introduction

Jussiaea suffruticosa Linn. (Onagraceae) is an herb or sub-shrub distributed in tropics and sub-tropics of the world. In India, it occurs from Himalaya and from southern part of Andhra Pradesh, Tamil Nadu and Karnataka. The plant has been used traditionally as purgative, anthelmintic, vermifuge and in flatulency (1 – 5). Decoction of the roots drunk in fever and the methanolic extract of roots possess antipyretic properties (6). However there is no report on diuretic activity of the plant. Hence, the present study was designed to substantiate the claims of the traditional use.

Materials and Methods

Plant collection and authentication

The whole plant of *Jussiaea suffruticosa* was collected from local areas of Chennai. The plant was identified and authenticated by botanist, Botanical Survey of India, Coimbatore. A herbarium specimen is deposited in our college museum (RMCP 0013).

Preparation of extracts

Shade dried powdered whole plant (100 g) was successively extracted with petroleum ether, chloroform and methanol in the increasing order of polarity (7). The solvents were removed from the extract by rotary flash evaporator.

In addition, 100 g of dry plant material was extracted with 300 ml of methanol in a soxhlet apparatus and solvent removed under reduced pressure (yield 6.4 %w/w).

Preliminary phytochemical screening

All the extracts were screened for the presence of various secondary metabolites like steroids, alkaloids, carbohydrates, tannins, flavonoids and glycosides using standard methods (7).

Animals

The male albino rats and mice (for acute toxicity study) of either sex were obtained from King Institute, Guindy. All the animals were stored in standard polypropylene cages and maintained at $27^{\circ}\text{C} \pm 2^{\circ}\text{C}$ under 12 h dark/light cycle. The animals were fed with standard rat feed and water was given *ad libitum*. Ethical clearance for handling of the animals and the procedures used in the study was obtained from the institutional animals ethical committee prior to the beginning of the study.

Acute toxicity study

The acute toxicity of methanol extract of *J.suffruticosa* was determined as per the CPSCEA guideline no. 420 (fixed dose method). It was observed that the test extract was not mortal even at 3200 mg/kg dose hence 200 and 400 mg/kg doses selected for further study.

Diuretic activity (8,9,10)

Male Albino rats of weighing 150 – 200 g were divided into four groups of six animals each. The animals were fasted for 24 h and water was given *ad libitum* during fasting. On the day of experiment, the animals of group I was administered with saline (25 ml/kg po) and served as control. Similarly, the animals of group II, III, IV were administered with furosemide 100 mg/kg (standard group), test extracts 200 mg/kg and 400 mg/kg orally respectively. Immediately after the treatments, the animals were placed in metabolic cages (2 animals in one cage) and urine was collected in the measuring cylinder upto 5 h. The volume of urine, Na, k and Cl were estimated in the urine for assessing diuretic activity (11, 12). Statistical analysis was made using Tukey-Kramer multiple comparison test.

Results and Conclusions

The phytochemical tests revealed the presence of alkaloids, steroids, flavonoids, carbohydrates, tannins and glycosides in methanol extract. The results of phytochemical screening in petroleum ether, chloroform and methanol extracts are given in Table 1. Treatment with methanol extract (400 mg/kg) has very significantly enhanced the volume of urine. However, 200 mg/kg of extract did not show a significant increase in volume of urine and other tested parameters.

The urinary levels of Na, K and Cl were very significantly increased by 400 mg/kg of extract and the effect is on par with the standard (100 mg Furosemide). The results are presented in Table 2.

Table 1 Phytochemical screening of *J.suffruticosa*

Type of constituents	Pet ether ext.	Chloroform ext.	Methanol ext.	Total methanol ext.
Alkaloids	-	-	+	+
Carbohydrates	-	-	+	+
Flavonoids	-	-	+	+
Glycosides	-	-	+	+
Tannins	+	+	+	+
Proteins	-	-	-	-
Steroids	+	+	+	+
% Yield	1.5	0.4	4.9	6.4

+ presence - absence

Table 2 Diuretic activity of methanolic extract of *J.suffruticosa*

S.No.	Treatment	Volume of urine in ml	Sodium (meq/l)	Potassium (meq/l)	Chloride (meq/l)
1.	Control	2.02 ± 0.36	83.4 ± 0.64	3.34 ± 0.54	0.17 ± 0.02
2.	Furosemide	6.64 ± 0.45 ^{***}	170.4 ± 0.05 ^{***}	7.52 ± 0.72 ^{***}	0.72 ± 0.02 ^{***}
3.	200mg extract	3.36 ± 0.27 ^{**}	118.5 ± 0.84 ^{**}	5.04 ± 0.52 ^{**}	0.28 ± 0.05 ^{**}
4.	400mg extract	5.54 ± 0.42 ^{***}	160.8 ± 0.45 ^{***}	7.8 ± 0.54 ^{***}	0.62 ± 0.04 ^{***}

*** p < 0.001 very significant, ** p < 0.01 significant

All three extracts have demonstrated the presence of carbohydrates, steroids, flavonoids and tannins that may be the major constituents of the plant. Acute toxicity study revealed that the methanol extract is non-toxic until 3200 mg/kg on experimental animals. The enhancement of urine volume and elevation of Na, K and Cl ions is in dose dependant manner. This may be due to the synergistic effect of all the phytoconstituents or any one constituent. The plants belong to Onagraceae family known to contain steroids and flavonoids, which may be responsible for the elicited action.

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