

DIURETIC ACTIVITY OF METHANOLIC SEED EXTRACT OF *NELUMBO NUCIFERA* GAERTN¹M.VISHNU VARDHAN REDDY, ¹A.RAJANI, ²K.HEMAMALINI, ³SV.RAMA RAJU¹Sree Dattha Institute of Pharmacy, Sheriguda, Ibrahimpatnam, Greater Hyderabad. ²Teegala Ram Reddy Collge of Pharmacy, Meerpet, Saroornagar, R.R District, ³Jaipur National University, Jaipur.

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ABSTRACT

Purpose: The present study was undertaken to investigate diuretic effect of methanol extracts of the dried seeds of *Nelumbo nucifera* Gaertn in normal rats.

Method: Methanolic extract of dried seeds of *Nelumbo nucifera* Gaertn were administered to experimental rats orally at doses of 300 and 500 mg/kg p.o. Furosemide (20 mg/kg) was used as positive control in study. The diuretic effect of the extract was evaluated by measuring urine volume, sodium, potassium and chloride content.

Results: In the normal rats diuresis began with low volumes of urine excreted until completing 24hrs. The level of Na⁺ and K⁺ was equally low. The furosemide (positive control) treated group, the diuretic action started in 60 minutes and increased significantly from normal rats. The increase in the ratio of concentration of sodium and potassium ions indicates that the extract increases sodium ion excretion to a greater extent than potassium. The chloride excretion was not elevated significantly by the lower dose. Out of both the doses 500mg/kg has shown noticeable diuretic property resulting in the superior urine excretions of Na⁺ and K⁺ ions which can be compared to the positive controls.

Conclusion: We can conclude that methanolic extract of dried seeds of *Nelumbo nucifera* Gaertn produced notable diuretic effect in a dose dependent manner which appeared to be comparable with that of the standard drug Furosemide.

Keywords: *Nelumbo nucifera* Gaertn, Diuretic activity, Furosemide, Kidneys.

INTRODUCTION

Diuretics are the drugs that increase the rate of urine flow, sodium excretion and are used to adjust the volume and composition of body fluids in a variety of clinical situations. Drug induced diuresis is beneficial in many life threatening disease conditions such as congestive heart failure, nephritic syndrome, cirrhosis, renal failure, hypertension and pregnancy toxemia¹. Most diuretic drugs have the adverse effect on quality of life including impotence, fatigue and weakness. Naturally occurring diuretics include caffeine in coffee, tea and cola, which inhibit Na⁺ reabsorption and alcohol in beer, wine inhibit secretion of Anti-diuretic hormone [2,3]. Still there is a requirement of highly effective and less toxic diuretics in clinical practice. Medicinal plants can be sources of drugs. Majority of the population for primary health care support they depend on herbal medicine.

Nelumbo nucifera is one of the plants that have been used for its medicinal properties since ancient times. The plant is often cultivated in India for their elegant flower which is the national flower of India. The rhizomes, flowers, stalks and leaves of lotus are used in the form of infusion in fever as refrigerant and diuretic⁵. *Nelumbo nucifera* Gaertn belonging to the family Nymphaeaceae is a perennial aquatic plant, which is distributed throughout Asia [6,7]. The seeds of *Nelumbo nucifera* have been used in traditional medicine for the alleviation of fever and treatment of bleeding, dizziness and haematuria⁸. As there is no literature available on diuretic activity of seeds of *Nelumbo nucifera*, the present study was chosen to evaluate the same.

MATERIAL AND METHODS

Plant collection, identification and authentication

The plant specimen was collected from S.V University, Tirupati, India and identified as *Nelumbo nucifera* Gaertn. Belonging to the family Nymphaeaceae, Voucher No: SDIP, Ref No: 003 dated 13/10/2012 and authenticated by Dr. Madhavachetty, Botanist, Tirupati. The seeds of the plant were dried in vacuum oven at 40° C.

Preparation of plant extract

Seeds of *Nelumbo nucifera* plant are coarsely powdered and are successively extracted by continuous hot percolation method using

Soxhlet apparatus employing methanol followed by distillation to recover the excess solvent. Methanolic extraction yielded sufficiently good quantity of the product. The extract was later subjected to drying and stored in a desiccator for further use⁹. The extract was insoluble in water. Therefore the extract was prepared as the suspension in 1% gum acacia solution in normal saline.

Standard used for the activity

Furosemide was used as the standard drug to compare the test results. It was prepared in the concentration of 20 mg/kg in distilled water as the solvent.

Animals used for the study

Adult male wistar rats (170-200 gms) were used for the study and kept at the laboratory animal house of Sree Dattha Institute of Pharmacy for acclimatization to laboratory environment. They were kept in well cross ventilated room at 27±2°C for 1 week before the commencement of experiment. Animals were provided with commercial rodent pellet diet and water ad libitum. Experiments were carried out as per the rules and regulations of CPCSEA.

Acute toxicity

Acute oral toxicity studies were performed as per OECD guidelines 425, dosed each animal at the dose of 3000mg/kg b.w.p.o. The animal was observed continuously for 2hrs for gross behavioral changes and intermittently once every 2hrs and finally at 24 and 72hrs to note any signs of toxicity including death.

Assessment of diuretic activity

Male wistar rats (175 - 200 gms) were maintained under standard conditions of temperature and humidity. The method of Lipschitz et al [10] was employed for the assessment of diuretic activity. Four groups of six rats each were fasted and deprived of water for 18hrs prior to the experiment. On the day of experiment, normal group of animals were given normal saline orally (25ml/kg body weight) and the treated groups were given 300mg/kg and 500mg/kg body weight of the methanolic extract of *Nelumbo nucifera*. The standard group was given furosemide (20mg/kg) intraperitoneally. The rats were placed in metabolic cages specially designed to separate faecal matter and urine. The urine volume was registered at 1, 2, 4, 6 and 24 hrs. post administration. During this period no food or water was

given to the animals. The total urine volume was measured for both control and treated animals. The sodium, potassium and chloride ion

concentration in the urine samples were determined and tabulated in Table:1.

Table 1: Effect of Diuretic action of methanolic extract of *Nelumbo nucifera*

Group	Dose (mg/kg)	Electrolyte concentration in m eq/l			
		Na ⁺	K ⁺	Cl ⁻	Na ⁺ /K ⁺
Control	25ml/kg	174.28 ± 12.68	89.24 ± 10.53	111.2 ± 8.9	1.95
Standard	20mg/kg	329.63 ± 12.65	126.56 ± 10.19	217.7 ± 11.4	2.60
MSNN	300mg/kg	228.60 ± 7.98	102.61 ± 9.8	127.87 ± 9.7	2.22
MSNN	500mg/kg	267.57 ± 8.34	109.45 ± 6.98	149.87 ± 8.7	2.44

Results are expressed as Mean ± SEM; n=5 in each group; *p<0.05, MSNN is methanolic extract of *Nelumbo nucifera*

RESULTS AND DISCUSSION

The % yield of methanolic extract of seeds of *Nelumbo nucifera* after 24hrs of hot percolation was found out to be 24%. The preliminary phytochemical screening showed the presence of various alkaloids such as nuciferin, N-nornuciferin, romerin, Liensinine, Neferine and Neferine have been reported from this herb [11,12]. Carbohydrates, glycosides, saponins, steroid like phytochemical constituents. Many herbal diuretics exert their action by directly affecting the electrolyte balance of minerals. In the normal rats diuresis began with low volumes of urine excreted until completing 24hrs. The level of Na⁺ and K⁺ was equally low. The furosemide (positive control) treated group, the diuretic action started 60 minutes and increased significantly from normal rats. The increase in the ratio of concentration of sodium and potassium ions indicate that the extract increases sodium ion excretion to a greater extent than potassium which is an essential quality of good diuretic with lesser hyperkalemic side effect [13]. The chloride excretion was not elevated significantly by the lower dose and the results are indicating that the extract is a potent natriuretic [14]. The test extract showed diuretic effect after the administration of 300mg/kg and 500mg/kg body weight dose. Out of both the doses 500mg/kg has shown noticeable diuretic property resulting in the superior urine excretions of Na⁺ and K⁺ ions which can be compared to the positive controls.

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