



Research Article

DIURETIC POTENTIAL OF METHANOLIC EXTRACT OF *CYPRAEA ARABICA* IN ALBINO RATS

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ABSTRACT

The present study aims to evaluate the diuretic effect of methanolic extract of *Cypraea arabica*. Albino rats were divided into four groups each with six rats. The first group of animals received normal saline (5ml/kg p.o), the second group received furosemide (5mg/kg p.o). The third and fourth groups received the methanolic extract of *Cypraea arabica* at the doses of 200mg/kg and 400mg/kg respectively. In 200 mg/kg and 400mg/kg of methanolic extract of *Cypraea arabica* treated rat, the volume of urine was recorded as 6.2ml and 7.8ml respectively. The results proved that the methanolic extract of *C.arabica* showed significant diuretic effect.

Keywords: Diuretic activity, Furosemide, Urine volume, Sodium, Potassium, Chloride

INTRODUCTION

Among the various phyla represented in the marine environment, the phylum mollusca is the second largest phylum in the animal kingdom next to arthropoda¹. The molluscs in total constitute a natural resource of sizable magnitude in many parts of the world. Molluscs have many representatives in the marine and estuarine ecosystem namely slugs, whelks, clams, mussels, oyster, scallops, squids and octopus. This rich diversity to marine organisms assumes a great opportunity for the discovery of new bioactive compounds². The majority of research on natural products from the phylum Mollusca has been focused on primarily soft-bodied or shell-less molluscs, particularly nudibranchs and opisthobranchs³.

Apart from human medicines, the research on marine natural products in the last three decades has also brought to the discoveries of many chemically and biologically interesting molecules, that have become indispensable tools in biochemical research and played significant roles in the recent advancement of life sciences⁴. Marine organisms are the potential source for producing new innovative drugs. Drugs which are used to increase urinary output and electrolyte excretion are called diuretics. These drugs mostly act on different parts of nephrons and increase urine volume. Diuretic can also increase the elimination of electrolytes⁵.

Kidney, as an excretory organ of our body serves important function of excretion of waste products, regulation of fluid volume and electrolyte content etc. Damage to kidney can lead to severe life threatening complications. Diuretics are drugs capable of increasing levels of urine. Drug-induced diuresis is beneficial in many life threatening disease conditions such as congestive heart failure, nephritic syndrome, cirrhosis, renal failure, hypertension and pregnancy toxemia⁶. Most diuretics proved to be very effective in promoting sodium excretion, all cause

potassium loss and prompted the search for potassium sparing diuretic⁷. Despite this, there is still need for extremely effective and less toxic diuretics in clinical practice. No systematic studies have been reported for the diuretic activity of *Cypraea arabica*. Therefore present study was aimed to explore the diuretic potential of methanolic extract of *Cypraea arabica*.

MATERIALS AND METHODS

Collection of sample

The gastropod *Cypraea arabica* was collected from Tuticorin coast (8°45'N ; 78°46'E) along Gulf of Mannar coastal region. The Gulf of Mannar is an established Marine National Park located between India and Srilanka on the Southeast Coast of India. The Specimens of *Cypraea arabica* were collected during low tides from the sea in their natural habitat that is intertidal zone and from reefs by divers, brought to the laboratory and maintained under laboratory conditions for further observations.

Preparation of extract

The shells were broken and the soft tissues were cut into pieces, and dried in hot air oven at 56° C for 5 days. The tissues were powdered and macerated with methanol. 100g of powder was exhaustively extracted with methanol in Soxhlet apparatus for 8h at 50-55°C. The extract was evaporated in a rotary vacuum evaporator to get a residue and this residue was used for diuretic study.

Experimental animals

Adult male wistar albino rats weighing about 150 - 180g maintained at SB College of Pharmacy animal house, Sivakasi were used for the present study with prior approval of Institutional Animal Ethics Committee (Approval.No: SBCP/2014-

15/CPCSEA/IAEC/I/K). The rats were housed in standard environmental conditions (temperature of 22±1°C), fed with standard food and water *ad libitum* with an alternating 12 hours light dark cycle and relative humidity of 60±5% during the whole period of the experiment.

Diuretic activity

The diuretic activity was evaluated in methanolic extract of *Cypraea arabica*. Male rats (Wistar Albino strain) weighing 150 to 200 gm were maintained under standard condition of temperature and humidity. The experimental protocols have been approved by the Institutional Animal Ethical Committee. Four groups of six rats in each were fasted and deprived of water for 18 hours prior to the experiment. The first group of animals serving as control received normal saline (5ml/kg p.o). The second group received furosemide (5mg/kg p.o). The third and fourth groups received the methanolic extract of *Cypraea arabica* at the doses of 200mg/kg and 400mg/kg respectively. Immediately after administration, the animals were placed in metabolic cages (4 per cage) specially designed to separate urine and faeces kept in room temperature of 25±0.5°C throughout the experiment. During this period, no food or water was made available to animals. The volume of urine was measured by using 10ml measuring cylinder and the results were reported. 24hr urine sample was analyzed for total urine volume and concentration of Na⁺, K⁺ and Cl⁻ in the urine.

The diuretic action of test drug was calculated by using the following formula

$$\text{Diuretic action} = \frac{\text{Urinary excretion of test drug group}}{\text{Urinary excretion in control group}}$$

Statistical analysis

The results were expressed as Mean ± standard error of mean. The data was analyzed statistically using one way analysis of variance (ANOVA) and Dunnett's t – test. P values less than 0.05 were considered as significant.

RESULTS

The present study shows methanolic extract of *Cypraea arabica* possessed good diuretic activity. The total volume of urine increased significantly. The total volume of urine recorded in the control was 4.53ml and in the standard 11.95ml. In 200 mg/kg and 400mg/kg of methanolic extract of *Cypraea arabica* treated rat, the volume of urine were recorded as 6.2ml and 7.8ml, 24 hours after the exposure of experiment (Table1). Further studies are required to assess the medicinal values of *Cypraea arabica* as a potent diuretic principle.

As shown in table 2 standard drug furosemide significantly increases urinary excretion of sodium, potassium and chloride. The methanolic extract of *C.arabica* at 200mg/kg significantly decreases sodium, potassium and chloride excretion when compared to standard but significance level decreases for potassium and chloride excretion. The methanolic extract of *C.arabica* at 400mg/kg also showed similar results like 200mg/kg but significant level decreases for potassium excretion.

DISCUSSION

Marine invertebrates, develop in a different environment than terrestrial animals. They are the source of a broad range of pharmacological substances⁸. Marine organisms are gaining much importance in terms of pharmaceutical potentials particularly invertebrates⁹. A lot of structurally and pharmacologically important compounds have been isolated from marine gastropods with novel antimicrobial, antitumour and anti-inflammatory properties¹⁰.

Diuretics relieve pulmonary congestion and peripheral oedema. These agents are useful in reducing the syndrome of volume overload, decreases cardiac workload, oxygen demand and plasma volume, thus decreasing blood pressure¹¹. Most diuretic drugs have adverse effect on the quality of life including impotence, fatigue and weakness. High efficacy diuretics have the drawback of causing increased excretion of potassium in urine¹². Hence diuretics play an important role in hypertensive patients. In the present study methanolic extract of *Cypraea arabica* produced diuretic effect by increasing the excretion of urine volume after the administration of the doses (Table 1). There was also a significant increase in excretion of urinary electrolytes like sodium, potassium and chloride. All the results were significant except potassium excretion which had lower level of significance compared to other electrolytes (Table 2). The diuretic activity of methanolic extract of *C.arabica* showed significant results, which necessitates further fractionation and isolation of bioactive compounds which is responsible for diuretic potential.

The results of the present study revealed that *C.arabica* possess diuretic capacity which was less than standard drug. Similar results were obtained by¹³ on *Vitis indica*,¹⁴ on gallic acid,¹⁵ on *Gracilaria dura*. So far diuretic effects of many medicinal plants have been carried out. However research investigations on the diuretic potential of the marine gastropods are scanty. Marine natural products have gained more interest when compared to other synthetic compounds. So, the present study has been carried out with a view to focus on the diuretic activity of methanolic extract of *Cypraea arabica*.

Table 1: Diuretic potential of methanolic extract of *Cypraea arabica*

Group	Drugs	Total urine volume (ml)	Diuretic action
I	Normal Saline 5ml/kg p.o	4.53 ± 0.16	-
II	Standard Furosemide 5mg/kg p.o	11.95 ± 0.27*	2.64
III	Methanolic extract of <i>C.arabica</i> 200mg/kg p.o	6.2 ± 0.35*	1.36
IV	Methanolic extract of <i>C.arabica</i> 400mg/kg p.o	7.8 ± 0.49*	1.72

Values are expressed as mean ± SEM; *p < 0.05 compared with control

Table 2: Effect of methanolic extract of *C.arabica* on urinary electrolyte excretion

Group	Urinary electrolytes excretion		
	Na ⁺ m.mol/L	K ⁺ m.mol/L	Cl ⁻ m.mol/L
Normal Saline 5ml/kg p.o	98.4±3.61	75.68±1.64	89.04±0.62
Standard Furosemide 5mg/kg p.o	135.6±1.16*	95.3±1.58*	117.2±0.85*
Methanolic extract of <i>C.arabica</i> 200mg/kg p.o	123.8±1.17*	91.7±1.13*	108.18±1.36*
Methanolic extract of <i>C.arabica</i> 400mg/kg p.o	127.4±1.52*	79.5±2.36*	101.6±1.13*

Values are expressed as mean ± SEM; *p < 0.05 compared with control

CONCLUSION

From the present study, it was concluded that the methanolic extract of *C.arabica* found to possess significant diuretic activity. Hence, further studies and isolation of active principles will be advantageous to provide novel bioactive constituents from methanolic extract of *Cypraea arabica*.

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