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Evaluation of Diuretic Activity of Aqueous Extract of *Raphanus sativus*

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Abstract: Diuretics are the first choice & famous class of antihypertensive therapy. The literature survey reveals that the plant Raphanus *sativus* family cruciferae. It is widely used to compact bacterial and viral infection, inflammation and cancer, it also possesses antiurolithiatic activity, antihelmintic and hepatoprotective effect. Recently in Ayurveda this plant is indicated for the purpose of diuresis, but till date systemic data is not available. However, the present study aimed to evaluate diuretic activity of aqueous extract of *Raphanus sativus* using Albino Wistar rats to produce systemic data. Phytochemical screening showed that positive tests for the presence of triterpenes, alkaloids, flavanoids, saponins and coumarins glycoside. *Method:* Male Wistar rats were selected & divided into five groups (n=6), as normal control, standard control & Extract control. Std. receive furosemide 20mg/kg body wt. extract control received aqueous extract of doses, 100, 300 and 400mg/kg body wt. orally. Results revealed that the cumulative urine volume collected at 5hrs after the treatment of extracted drug and Furosemide was found to be11.5ml,13,14.2 and 26.2ml, respectively as compare to 8ml of total volume of normal control of animal.in c*onclusion, the* inrease in urine volume clearly indicated and confirmed the diuretic activity of aqueous extract of *Raphanus sativus.*

Key words: *Raphanus sativus* · Aqueous extract · Cruciferae · Frueosmide · Diuretic activity

INTRODUCTION

Hypertension is considered to be a predisposing factor for stroke, coronary heart disease, peripheral arterial disease, heart failure and end-state renal disease [1]. Common clinical strategies to achieve a lowering of blood pressure include the use of angiotensin converting enzyme (ACE) inhibitors, beta blockers, calcium channel blockers (or CCB's) and diuretics [2]. Diuretics work by promoting the expulsion of urine volume [UV] and urinary sodium (UNa) from the body and this helps reduce the volume of blood circulating through the cardiovascular system and cardiac output [1].

Raphanus sativus, some times known as Redish belong, to the family Cruciferae. [3], Is cultivated throughout the world for its roots. Phytochemical test reveled the presence of triterpenes, alkaloids, flavanoids, tannins, saponin and coumarins, but it was negative for cynogenic glycosides, anthraquinone glycosides [4]. It is widely used to compact bacterial and viral infections, inflammation and cancer.,The ethnomedicinal information of the plant described the use of aqueous extract to have antiurolithitic activity [5]. Also it is used as anthelmintic and in heart diseases of. Ethanolic and aqueous extract have shown to possess heptoprotective effect on rabbits [6].

The present study was carried out to confirm the use of Raphanus sativus as diuretic.

MATERIALS AND METHODS

Fresh roots of *Raphanus sativus* were used in this study. The plant material, collected in the state of Maharashtra at pune was Authenticated at the Department of Pharmacognosy MAEER's Maharashtra institute of pharmacy, pune. India and a voucher specimen of the plant (A-01) is deposited for reference.

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Fig. 1: Raphanus sativus

Preparation of Extract: The extract was prepared by cutting the fresh roots of *R. sativus* (500 g) into small pieces and drying. Dried roots were crushed to powder and refluxed (5 h) with destilled water (5: l). The extract was concentrated almost to drysness under reduced pressure and then allowed to evaporate to dryness (yield 45 g,).

Experimental Animals: Wistar rats of either sex with body weight of 150–250 g were used. They were housed under standard animal husbandry conditions and had free access to pellet diet and tap water during the study. The experimental protocols were approved by the Institutional Animal Ethical Committee (941/C/06/CPCSEA/2008-09/A-03) of MAEER's Maharashtra Institute of pharmacy Pune-411038 and CPCSEA Committee.

METHOD

The method of Lipschitz *et al*.[7] *and* Ghule *et al*. [8] with slight modification was employed for the assessment of diuretic activity. The experimental protocols have been approved by the institutional Animal Ethical Committee, In this method, male rats weighing between 150-200 g, deprived of food and water for 18 h prior to the experiment were divided in five groups of six rats in each. The first group of animals, serving as control, received normal saline (25 ml/kg, p.o.); the second group received furosemide (20 mg/kg, i.p.) in saline; the third and fourth and fifth groups received the aqueous extract at doses of 100 and 300 mg/kg, 400 mg/kg respectively, in normal saline. Immediately after administration, the animals were placed in metabolic cages (2 per cage), especially designed to separate urine and faeces, kept at 20±0.5°. The volume of urine collected was measured at the end of 5 h. During this period, no food and water was made available to animals. The parameters taken were the body weight before and after test period, total urine volume, concentration of Sodium (Na+), Potassium (K+) and Chlorine (Cl-) in the urine.

Na+ and K+ concentrations was determined by flame photometer and Cl^- concentration was estimated as NaCl by titration with silver nitrate solution (2.096 g/l) using one drop of 5% potassium chromate solution as indicator.

RESULTS AND DISCUSSION

Phytochemical screening showed that *Raphanus stivus* was positive for triterpenes,alkaloids, flavanoids, saponins and coumarine.

Significant increase in the volume of urine was seen at 400 and 300 mg/kg ($p<0.001$) and dose dependent increase in the excretion of electrolyte was exhibited from aqueous extracts of *Raphanus sativus*. Frueosmide treated rats showed a significant increase in volume of urine and marked increase in excretion of sodium, potassium and chloride ($p< 0.001$) as compared to normal control (Table 1).

Diuretics relieve pulmonary congestion and peripheral edema. These agents are useful in reducing the syndrome of volume overload, including orthopnea and paroxysmal nocturnal dyspnoea. They decrease plasma volume and subsequently venous return to the heart (preload). This decreases cardiac workload, oxygen demand and plasma volume, thus decreasing blood pressure. Thus, diuretics play an important role in hypertensive patients [1].

Table 1: Diuretic Activity Of Aqueous Extract Of *Raphanus Sativus*

Experiment gp	Dose	Volume of Urine in ml	Total sodium (mEq/l)	Total potassium (mEq/l)	Total chloride (mEq/l)	Na+/k+ Ratio
Control (Normal saline)	25ml/kg,p.o.	8±0.11	50±3.16	25±0.57	62.15± 1.54	2
Standard (Frusemide)	20mg /kg,i.p.	26.2±0.39**	72±0.32 **	32±0.52**	120±2.2 **	2.25
Extract control	100mg/kg p.o	11.5±0.16**	40±0.94**	15±0.93**	70.14 ±2.1	2.67
Extract control	300mg/kg p.o.	13±0.14 **	54±0.39**	25±0.57	87.2±3.57	2.16
Extract control	400 mg/kg p.o.	14.2±0.12**	65±0.69**	28±0.81*	93.7±0.86**	2.32

All the data are expressed as mean±SEM and analyzed by ANOVA followed by Student *t* -test (n=6). *indicate significant at p<0.01, **indicate significant at p<0.001 when compared to normal control.

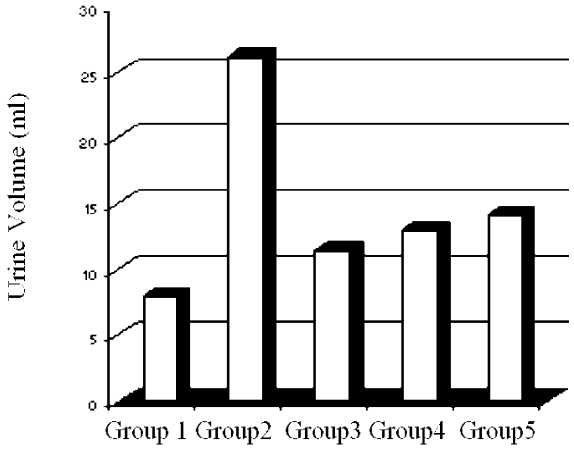

Fig. 2: Effect of Aqueous Root Extract of *Raphanus Sativus* on Urine Output.

The preliminary study supported the presence of effective diuretic constituents in the aqueous extract of *Raphanus sativus.* It is reported previously that the flavonoid glycosides are endowed with diuretic activity [9, 10]. It may therefore be presumed here that the diuretic activity is due to presence of flavonoids in the test extract. All these extracts at 100 mg/kg, 300mg/kg and 400mg/kg, showed increase in urine volume (Fig. 2) and also the concentration of Na^+, K^+ and Cl^- in urine [Table 1].

The increase in the ratio of concentration of excreted sodium and potassium ion for the tested extract, compared to control, indicates that the extract increases sodium ion excretion to a greater extent than potassium, which is a very essential quality of a good diuretic with lesser hyperkalaemic side effect [9, 11].

CONCLUSION

The roots of *Raphanus sativus* possesses Hyperchloremic, Hypernatremic and Hyper kalemic diuretics. The present study thus justifies the traditional use of *Raphanus sativus* as diuretic and also points out that *Raphanus sativus* warrants future detailed investigation as a promising diuretic agent.

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