

DIURETIC ACTION OF GARLIC EXTRACT IN ANAESTHETISED NORMOTENSIVE DOGS

Pages with reference to book, From 280 To 282

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Abstract

Intravenous administration of garlic extract (25.9 mg/kg body weight), significantly increases urinary output in dogs, which was also found to be dose dependent. The pH of urine was not altered after the administration of garlic extract. Effect of intravenous administration of Furosemide (1.0 mg/kg b. wt.) was also observed for control comparison. It was found that the garlic in high doses (54.0 mg/kg b. wt.) produces almost the same amount of increase in urinary out-put as does furosemide 1.0 mg/kg b. wt. It may be concluded that garlic produces its hypotensive action partially due to its diuretic effect (JPMA 36:280, 1986).

INTRODUCTION

Garlic is the fresh compound bulb of *Allium Sativum* Linn (Fam. Liliaceae). It has diuretic, antiseptic, diaphoretic and expectorant properties^{1,2}

Garlic is stimulant, diaphoretic, expectorant, diuretic and tonic when administered intravenously (Dictionary of the Economic products of India, 1889).

Hippocrates employed garlic as a diuretic and for the treatment of pneumonia and suppurative wounds³.

Chopra et al⁴ reported the beneficial use of garlic in a variety of ailments such as hypertension, gastritis, typhoid, cholera and tuber. culosis.

The aqueous extract of garlic has a hypotensive effect in normotensive and hypertensive rats.⁵⁻⁸

In this study, the action of garlic extract on the urinary out-put in anaesthetised normotensive dogs was observed as one of the parameters in investigating the mechanism of its hypotensive action. Water soluble fraction of the alcoholic extract of garlic was used, as this fraction has been found to have the maximum hypotensive activity.

The dose, 25.9 mg/kg body weight was administered as it produces 50% of the maximum hypotensive response in dogs.

MATERIAL AND METHODS

Source and Procurement of Experimental Animals (Dogs).

Twenty four female dogs weighing between 14.6-18.5 kg were obtained from various localities of Karachi. They were cleaned and treated for eradicating the blood sucking ectoparasites and were kept under observation for 810 days to establish and confirm their normal state of health, before being used for the experiment. They were given normal standard diet, and were divided into four groups. Each group comprised of six dogs.

EXPERIMENTAL PROCEDURE

This procedure has been adopted to evaluate drugs for their diuretic and anti-diuretic activity.⁹

After anaesthetising female dogs with Nembutal (30 mg/kg body weight) intravenously¹⁰ their lower

abdomen was opened by a transverse incision and both the ureters were identified, and opened by small longitudinal incisions a few inches above the bladder opening. Both the ureters were cannulated by suitable porter vinyl-tubing and the urine flowing through the tubings of both sides was collected in a single graduated measuring cylinder for thirty minutes for each record of observation. pH of urine was also determined at each time interval. Femoral vein of one side was cannulated and attached to a burette filled with normal saline for administering drugs in a fixed volume of 1.0 ml followed by 1.0 ml normal saline every time. The animal was kept at its own body temperature by adjusting a regulatory mechanism provided in the operation table.

The effect of 13.5mg and 25.0mg/kg body weight of garlic extract administered through a canula in femoral vein was observed in different groups of animals. Urine was collected for 30 minutes in a single graduated measuring cylinder for recording the effect of each dose of the garlic extract. The volume of urine thus collected was compared with the volume of the collected-urine before each administration of garlic extract. pH of urine before and after each administration of garlic extract was also observed and compared. Effect of 1.0 mg/kg b. wt. furosemide intravenously was also observed in the same manner for comparisons.

RESULTS

a) After the administration of garlic extract in a dose of 13.5 mg/kg b.wt., the volume of urine collected in 30 minutes, increased only from 8.42 ± 0.48 to 9.12 ± 0.56 (Table -1).

TABLE - I
Effect of the Garlic Extract (25.9 mg/kg body weight) on Urinary out-put in Dogs.

S. No.	No. of Dogs used	Dose of garlic extract administered	Total volume of urine collected in 30 minutes (Ml)		Percentage increased	P value	pH of urine
			Before the administration of garlic extract (Control volume)	After the administration of Garlic extract			
1	SIX	13.5 mg/kg b.wt.	8.42 ± 0.48	9.12 ± 0.56	8.25 ± 0.38	>0.3	Acidic
2	SIX	*25.9 mg/kg b. wt.	8.42 ± 0.48	10.34 ± 0.66	22.80 ± 1.58	<0.01	Acidic

*Dose producing 50% of the maximum hypotensive response in dogs.

b) After the administration of garlic extract in a dose of 25.9 mg/kg body weight, the volume of urine collected in 30 minutes increased significantly ($P < 0.01$) from 8.42 ± 0.48 to 10.34 ± 0.66 , (Table 1).

c) For control comparisons the effect of furosemide (1 mg/kg b. wt. IN) was also studied in the same way and it was found that the output of urine increased significantly ($P < 0.001$) as shown in table II.

TABLE – II
Effect of the Garlic Extract Furosemide and on Urinary Out-put in Dogs.

S. No.	No. of Dogs used	Dose of the drugs	Total volume of urine collected in 30 minutes (Ml)		Percentage increased	P value	pH of urine
			Before the administration of drugs	After the administration of drugs			
1.	SIX	Furosemide 1 mg/kg b. wt.	8.16 ± 0.42	10.98 ± 0.62	34.55 ± 2.16	<0.001	Acidic
2.	SIX	Garlic extract 54 mg/kg b. wt.	8.22 ± 0.37	10.94 ± 0.53	33.09 ± 1.97	<0.001	Acidic

d) Following the administration of garlic extract (54 mg kg b.wt. i.v) the urinary output was significantly ($P < 0.001$) increased from 8.22 ± 0.37 to 10.94 ± 0.53 , showing an increase of 33.09 ± 1.97 (Table -II). This effect of garlic extract was equivalent to furosemide (1. mg /kgb.wt.I/V).

DISCUSSION

Garlic extract produces a significant dose dependent increase in the urinary output on intravenous administration. The doses of 25.9 mg/kg b. wt., and above produce a significant increase in the rate and volume of urinary out-put. Smaller doses (13.5 mg/kg b. wt.) produce only a slight increase in the urinary out-put.

Garlic extract in 54 mg/kg b.wt. , dose is equivalent to furosemide in its diuretic effect. pH of the urine after each dose of garlic extract, remained acidic. The administration of known diuretics, like thiazides and related agents (Hydrochlorothiazide, chlorthalidone). Loop diuretics e.g. Triameterene, Spironolactone and amilo ride all produce hypotensive effect in varying doses. Of these, thiazide and closely related phthalimidine derivatives have become a main-stay of antihypertensive therapy. Their hypotensive effect during chronic administration appears to be due to vasodilatation, rather than to saluresis or loss of free water¹¹ The cardiac out-put and glomerular filtration rate remains normal, while mean arterial pressure is reduced and systemic vascular resistance falls¹² Lutterodt et al' reported that antihypertensive effect of thiazides lasts longer and occurs at lower dose levels than does the diuretic effect.

It may be concluded that garlic extract produces its hypotensive action partly due to its diuretic effect. More over it has also been found in other experiments that garlic extract has a significant vasodilatory action. Its action resembles that of thiazide diuretics as they also produce diuresis, saluresis and vasodilatation. However, saluretic effect of garlic extract could not be determined.

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