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Comparison of Diuretic Effect of Urosinal and Furosemide in Goats

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ABSTRACT

Urosinal, a patent herbal preparation containing Solanum nigrum, Solanum nigrum berries, Cichorium intybus and potassium nitrate, when orally administered to goats (1.0 ml kg^{-1} body weight), showed lesser diuretic effect as compared to furosemide (5.0 mg kg^{-1} body weight), however the diuresis in urosinal treated goats gradually increased with time. Decreased renal clearance of potassium and urea, while an increase in renal clearance of creatinine, sodium, bicarbonate and chloride was observed in urosinal treated goats as compared to furosemide treated goats.

Key Words: Diuretic; Herbal; Urosinol; Furoemide

INTRODUCTION

Plants have been mankind's first medicine. Traditional plant based medicines have played an important role in the development of pharmaceutical industry in all over the world. In spite of great advances in diagnosis, drug designing and synthetic organic chemistry, folkloric medicine is still the primary form of healing methods available to the majority of the people in developing countries. Even in United States, over half of the prescriptions contain plant based compounds. Recent advances in biotechnology and genetic engineering have undoubtedly contributed a lot towards the health care but it has been now realized that synthetic drugs cannot always duplicate the curative effects of natural products, because millions of years of plant production might have led to the development of many secondary metabolites with various and unique chemical structures that scientists have not even thought of. In Pakistan, little efforts have been made to exploit its natural herbal heritage. There is a long list of plants, found in Pakistan (Said, 1970), which are locally used as diuretics but no authentic literature is available about their efficacies. Diuretic effects of Cichorium intybus in dogs (Nawaz *et al.*, 1991) and goats (Nawaz *et al.*, 1993) have already been reported. This paper deals with the diuretic effect of urosinal and furosemide in goats.

MATERIALS AND METHODS

Herbal preparation and standard diuretic. Urosinal, a patent herbal preparation manufactured by Qarshi Industries Lahore, was used as the herbal preparation. The reported composition of urosinal is Solanum nigrum (125 mg), Solanum nigrum berries (62.5 mg), Cichorium intybus (125 mg), potassium nitrate (500 mg) and barley salt (500 mg) for each 10 ml of the medicine. Furosemide (Lasix, Hoechest) was used as the standard diuretic. Furosemide is a thoroughly investigated and commonly used diuretic characterized by its quick onset, transient diuretic and natriuretic effects (Scholz & Gries, 1989; Hinchliff *et al.*, 1991).

Animals and experimental protocol. Experiments were conducted on eight healthy goats of berbari/taddy breed with an average body weight of 25 kg. The animals were sent out for grazing until midday, water was provided ad libitum. Animals were maintained under similar conditions of management. After restraining the animal, a balloon catheter was introduced into the urinary bladder of each animal for collection of urine, while jugular vein was cannulated for collection of blood samples. Each blood sample was collected between two consecutive urine samples. The volume of urine and the pH of urine and blood samples were noted just after their collection. Urosinal and furosemide were administered orally to respective experimental and standard groups of goats at the dose level of 1.0 ml kg^{-1} and 5.0 mg kg^{-1} body weight respectively. Thereafter, blood and urine samples were collected at 30 minutes interval upto 150 minutes. Samples were analyzed for sodium and potassium (Welcher, 1960) chloride (Wagner, 1956), bicarbonate (Herbert, 1980), creatinine (Bonsnes & Tausky, 1945) and urea (Varley *et al.*, 1965). Diuresis and renal clearance were calculated as

Diuresis = Volume of urine voided/minute/kg body weight

$$\text{Renal} = \frac{\text{Urine concentration} \times \text{diuresis}}{\text{Plasma concentration}}$$

Table I. Effect of Urosinal and Furosemide on diuresis

Time after Administration (minutes)	Average ± SE diuresis (ml min^{-1} kg^{-1} body weight)		Percentage change in diuresis then furosemide	
	Furosemide	Urosinal	Furosemide	Urosinal
30	0.055 ± 0.018	0.026 ± 0.006	100	47
60	0.062 ± 0.026	0.035 ± 0.011	100	57
90	0.057 ± 0.021	0.037 ± 0.013	100	65
120	0.048 ± 0.024	0.038 ± 0.015	100	79
150	0.043 ± 0.017	0.033 ± 0.015	100	82
Average	0.053 ± 0.021	0.034 ± 0.012	100	66

RESULTS AND DISCUSSION

It is apparent from results presented in Table I that furosemide showed its maximum diuretic effect during 30-60 minutes interval. Quick onset of diuresis by furosemide in rats and calves has already been reported (Brater *et al.*, 1982). Although urosinal showed only 47% diuresis as compared to furosemide during 0 to 30 minutes interval but a steady increase in diuresis in each interval has been noticed in urosinal treated goats as the increase in diuresis reached 82% in the last interval (between 120-150 minutes after administration of urosinal). It indicates a delayed diuretic action of urosinal which may be attributed to its delayed absorption. Moreover transient nature of diuretic effect of furosemide as reported by Itoh *et al.* (1992) has also been observed in these studies as the diuresis increased up to a maximum of 0.062 ± 0.026 ml min^{-1} kg^{-1} body weight after sixty minutes and dropped to 0.057 ± 0.021 ml min^{-1} kg^{-1} body weight in the following interval (60-90 minutes) and finally to 0.043 ± 0.017 ml min^{-1} kg^{-1} body weight in the last

Table II. Effect of Urosinal and furosemide on various parameters of blood and urine in goats

Parameters and Units	Furosemide (5.0 mg kg^{-1} body weight)	Urosinal (1.0 mg kg^{-1} body weight)
Diuresis (ml min^{-1} kg^{-1})	0.05 ± 0.02	0.03 ± 0.01
pH Blood	7.80 ± 0.09	8.02 ± 0.02
pH Urine	8.35 ± 0.05	8.75 ± 0.05
Creatinine (μg ml^{-1})		
Plasma	9.85 ± 0.52	8.58 ± 0.383
Urine	319.16 ± 7.22	334.81 ± 18.14
Urea (μg ml^{-1})		
Plasma	617.27 ± 27.7	1964.8 ± 168.34
Urine	6376.00 ± 337.00	16243.00 ± 1262.00
Sodium (m.eq l^{-1})		
Plasma	158.01 ± 1.74	148.8 ± 4.79
Urine	179.4 ± 7.74	214.33 ± 11.65
Potassium (m.eq l^{-1})		
Plasma	6.24 ± 0.09	6.66 ± 0.69
Urine	332.91 ± 33.67	194.16 ± 9.14
Chloride (m.eq l^{-1})		
Plasma	124.08 ± 0.42	113.60 ± 6.80
Urine	118.00 ± 10.70	219.12 ± 13.624
Bicarbonate (m.eq l^{-1})		
Plasma	109.42 ± 2.94	39.35 ± 1.31
Urine	195.94 ± 16.08	126.6 ± 1.75
Renal clearance (ml min^{-1} /kg)		
Creatinine	1.87 ± 0.33	2.07 ± 0.15
Urea	0.45 ± 0.07	0.35 ± 0.05
Sodium	0.06 ± 0.01	0.13 ± 0.04
Potassium	1.52 ± 0.14	0.87 ± 0.06
Chloride	0.04 ± 0.01	0.05 ± 0.03
Bicarbonate	0.06 ± 0.01	0.10 ± 0.01

interval (120-150 minutes) in furosemide treated goats.

Effects of urosinal and furosemide on blood, urine pH and electrolyte, creatinine and urea contents of blood and urine and their renal clearance have been presented in Table II.

The above table showed a noticeable increase in urine pH of urosinal treated goats which is justified by an increase in renal clearance of bicarbonate in urosinal treated goats as compared to furosemide treated goats. It is further observed that in urosinal administrated goats, the renal clearance of sodium is almost doubled while the renal clearance of potassium is almost halved as compared to furosemide treated goats.

These preliminary but promising results justify the use of urosinal as diuretic. Moreover, the potassium sparing diuretics, just like the urosinal are more desirable in order to avoid hypokalemia during diuretic therapy.

To establish the real potentials of urosinal as a renal diuretic, further studies using larger dosage and longer periods of sample collection must be carried out in different species of animals.

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