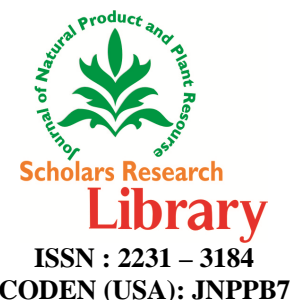




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Evaluation of Diuretic Potential of A Polyherbal Formulation

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ABSTRACT

The study is an attempt to investigate diuretic activity of ethanolic extract of a polyherbal formulation of three drugs *Bryophyllum pinnatum*, *Syzigium aromaticum* & *Ocimum sanctum* by in-vivo method described by Lipschitz et al. (1943). In the present study, the extract of polyherbal formulation (*Bryophyllum pinnatum*, *Syzigium aromaticum* & *Ocimum sanctum*) was found to possess significant activity. This activity of polyherbal formulation extract may be attributed to their ability to sparks the excretion of Na^+ , K^+ and Cl^- concentration in urine along with increase in urinary volume.

Key words: Polyherbal; diuretic activity; ethanolic extract

INTRODUCTION

Man has been using herbs and plant products for its medicinal use since times immemorial. However, it is imperative that the traditional systems should be scientifically supported for their efficacy and safety. Diuretics, either alone or in combination with other drugs, are valuable in the treatment of hypertension, congestive heart failure, ascites & pulmonary edema. Two widely used diuretics, thiazides and the high ceiling loop diuretic, furosemide, have been associated with a number of adverse effects, such as, electrolyte imbalance, metabolic alterations, development of new-onset diabetes, activation of the renin-angiotensin-neuroendocrine systems and impairment of sexual function. Many indigenous drugs have been claimed to have diuretic effect in Ayurvedic system of medicine but lack scientific authentication. [1,2,3,4,5]

The plants under study are *Syzigium aromaticum* belongs to family Myrtaceae, traditionally used in the treatment for stomach upsets, vomiting and diarrhea etc. [6] *Bryophyllum pinnatum* belongs to family Crassulaceae traditionally used in the treatment for Tonsillitis, traumatic injury, fracture and strains etc. [7] & *Ocimum sanctum* belongs to family Lamiaceae traditionally used as antiseptic, analgesic and controls the infections. [8]

The present study is to determine the diuretic activity of ethanolic extract of polyherbal formulation of three drugs *Bryophyllum pinnatum*, *Syzigium aromaticum* & *Ocimum sanctum*.

MATERIALS AND METHODS

Plant material

The plant parts (leaves of *Bryophyllum pinnatum*, buds of *Syzigium aromaticum* & Leaves of *Ocimum sanctum*) were procured from local market of Bhopal (M.P.) and authenticated from Department of Botany, Saifia College, Bhopal (Voucher No. 277/bio/saf/11/a, 278/bio/saf/11/b, 279/bio/saf/11/c). After authentication the plant parts were washed, shade dried and ground in a mechanical grinder to obtain coarse powder for extraction.

Plant extraction

The powdered plant parts were extracted with ethanol using maceration method. The extract was then dried and stored. 0.714 mg of each extract were taken and mixed to prepare a polyherbal formulation for assaying antioxidant activity. [9]

Animal care and handling

The experiment was carried out on Wistar albino rats of 4 months, of both sexes, weighing between 100 to 150 gm. They were provided from Sapience Bio-analytical Research Lab, Bhopal, (M.P.). The animals were acclimatized to the standard laboratory conditions in cross ventilated animal house at temperature $25\pm 2^{\circ}\text{C}$ relative humidity 44 – 56% and light and dark cycles of 12:12 hours, fed with standard pellet diet and water *ad libitum* during experiment. The experiment was approved by the institutional ethics committee and as per CPCSEA guidelines (approval no. 1413/a/11/CPCSEA).

Drugs and Chemicals:

Cystone, Ketamine, Frusemide and Xylanine were purchased from Rajshree Medicine Store, Bhopal. All the other chemicals used in the study were of analytical grade.

Assessment of Diuretic activity:

The animals were divided into four groups (six in each) deprived of food and water for 18hrs prior to the experiment. On the day of experiment, the group I animals received normal saline (5ml/kg, p.o.). The group II animals received frusemide (10mg/kg, i.p.) the group III and IV animals received ABP (200mg/kg, p.o.) and Formulation (200mg/kg, p.o.) respectively. Immediately after the administration, the animals were kept in metabolic cages (two per cage) specially designed to separate urine and fecal matter and kept at room temperature. The total volume of urine was collected at the end of 24h. During this period no water and food was made available to the animals. The parameters accounted for ascertaining the diuretic activity are total volume of urine and urine concentrations of Na^+ , K^+ and Cl^- . The Na^+ and K^+ concentrations were measured by flame photometry and Cl^- concentration was estimated by titration with silver nitrate solution using potassium chromate as indicator. [10, 11]

RESULTS AND DISCUSSION

Present study shows that the ABP and polyherbal formulation (suspension) possess good diuretic activity.

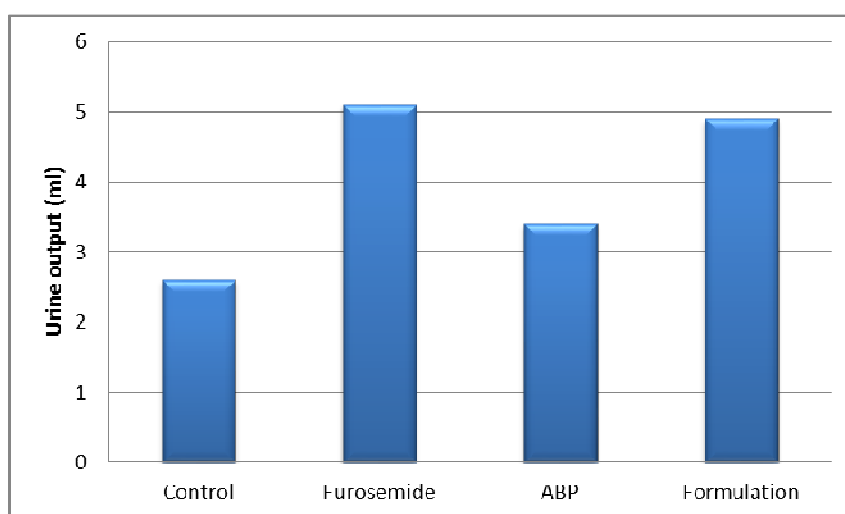
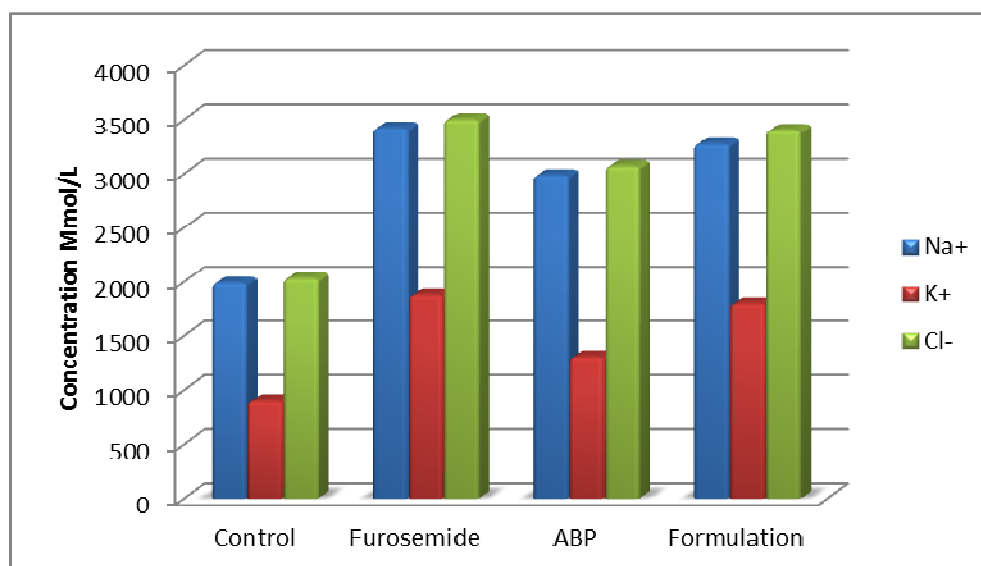
In present study ABP and polyherbal formulation showed elevated levels of Potassium in urine, which may increase risk of hypokalemia and hence its potassium sparing capacity has to be investigated. Results of present investigation showed that formulation is most effective in increasing urinary electrolyte concentration of all the ions i.e Sodium, Potassium and Chloride. A complex set of interrelationships exists among the cardiovascular system, the kidneys, the central nervous system (Na^+ , appetite, thirst regulation) and the tissue capillary beds (distribution of extracellular fluid volume), so that perturbation at one of these sites can affect all the remaining sites. One of the earliest strategies for the management of hypertension was to alter Na^+ balance by restriction of salt in the diet. Diuretic agents having antihypertensive effects were used alone and had greater efficacy than all other antihypertensive drugs. In this study pharmacological evaluation of diuretic action of ABP and polyherbal formulation was evaluated using furosemide under controlled laboratory condition. As diuretic therapy may lead to number of life threatening electrolytic disorder and toxicities, so safety profile studies are carried out following a sub chronic administration of extracts. This amplifies the heterogenous array of diuretic curatives available for safe and effective treatment of edema and cardiovascular diseases. Active principles such as flavonoids, saponins and terpenoids are known to be responsible for diuretic activity.

Table I: Effect of ABP and Formulations on urine volume and electrolyte contents of urine at 24 Hrs

S. No	Treatment	Dose (mg/kg)	Urine volume (ml)	Electrolyte Excretion		
				Na ⁺ μ mole/kg	K ⁺ μ mole/kg	Total chloride μ Moles/kg
1.	Control	10ml/kg	2.6 \pm 0.21	1990 \pm 36	904 \pm 33	2030 \pm 22
2.	Furosemide	10	5.1 \pm 0.75**	3422 \pm 67**	1880 \pm 302**	3502 \pm 60**
3.	ABP	200 mg/kg	3.4 \pm 0.26*	2987 \pm 54*	1309 \pm 489*	3071 \pm 24*
4.	Formulation	200 mg/kg	4.9 \pm 1.05**	3274 \pm 43**	1801 \pm 150**	3402 \pm 11*

N=6, data was expressed as mean \pm S.E.M; * p <0.05 and ** p <0.001 as compared to normal control (one way ANOVA followed by student "t" test).

Figure I - Graph showing effect of ABP and formulation on urine output

Figure II- Graph showing effect of ABP and formulation on urine parameters (concentration of Na⁺, K⁺ and Cl⁻ concentration)

CONCLUSION

In conclusion, the presented data indicate diuretic activity of both ABP and polyherbal formulation. The mechanism underlying this effect is still unknown, but is apparently related to increased diuresis and lowering of urinary concentrations of calculus promoters, increasing level of calculus inhibitors, antioxidant activity of the flavonoids and change in shape and texture of the urinary stone.

Statistical analysis

The data of urinary, renal and serum parameters were expressed as mean \pm SEM. The results were analyzed statistically using ANOVA followed by Dunnett's t-test. The minimum level of significance was fixed at $p < 0.05$.

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