ORIGINAL ARTICLE

Diuretic activity of a herbal product UNEX

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In the present study, product UNEX capsules (syn. Herbajules Tricare in Malaysia) was tested for diuretic activity using the Lipschitz test. The product UNEX containing the extracts of Boerhaavia diffusa and Tribulus terrestris was studied at two dose levels of 600 and 800 mg/kg body weight (p.o.). Standard drug used was furosemide (20 mg/kg body weight) in a 0.9% sodium chloride solution. Urine volume was recorded for all the groups for 5 hours. The product UNEX exhibited significant diuretic activity at doses of 600 and 800 mg/kg body weight as evidenced by increased total urine volume and the urine concentration of Na^+, K^+, and Cl^-. The result thus supports the use of product UNEX as diuretic.

Key words: UNEX capsules, diuretic activity, lipschitz test, *Boerhaavia diffusa*, *Tribulus terrestris*, flame photometry

INTRODUCTION

Drugs that induce diuresis (enhances urine outflow) are known as diuretics.[1] Diuretics relieve pulmonary congestion and peripheral edema. This decreases cardiac workload, oxygen demand and plasma volume, thus decreasing blood pressure. Thus, diuretics play an important role in hypertensive patients.[2] Plant medicine is commonly used in the traditional treatment of some renal diseases, and many plants are reported to possess significant diuretic activity. The diuretic activity of a number of plants used in ethnomedicine as diuretic agents has been confirmed in experimental animals.[3] One herbal product UNEX (syn. Herbajules Tricare in Malaysia), manufactured by Unijules Life Sciences Ltd., Nagpur, containing *Boerhaavia diffusa* and *Tribulus terrestris* is being used widely as diuretic drug. *Tribulus terrestris* L. (Zygophyllaceae) is a herbal remedy used for various medicinal purposes including the treatment of kidney troubles, particularly stones. For this purpose it is either used alone or in combination with other plants.[4] The roots of *B. diffusa* (Nyctaginaceae) were well-known for its diuretic properties.[5] So for no scientific evidence was observed for the claimed activity of this product. In this regard we have aimed to identify the diuretic effect of UNEX.

MATERIALS AND METHODS

Procurement of Product

The product (UNEX capsules) was provided by the Unijules Life Sciences Ltd, Nagpur, India.

Drugs and Chemicals

All the drugs, chemicals, and reagents were procured from SD Fine–Chem. Ltd, Mumbai (MS), India. All the chemicals were of an analytical grade.

Procurement and Selection of Animals

Wistar albino rats of either sex weighing between 100 and 150 g were obtained from B.R.N.C.P., Mandsaur Animal House. These animals were used for the acute toxicity and diuretic activity. The animals were stabilized for 1 week; maintained under standard conditions at room temperature, 60 ± 5% relative humidity, and 12-hour light–dark cycle. They had been given standard pellet diet and water *ad libitum* throughout the course of the study. The animals were handled gently to avoid giving them too much stress, which could result in an increased adrenal output. The study was approved by Institutional Animal Ethics Committee (Reg No.-981/ac/05/CPCSEA).

Acute Toxicity Study

The acute toxicity study was carried out in adult female albino rats by the "fixed dose" method of OECD (Organization for Economic Co-operation and Development) Guideline No.420. The fixed dose method as in Annex 2d, test procedure with a starting dose of 2000 mg/kg body weight was adopted. The animals were fasted overnight and next day the product (UNEX capsules) containing extracts of the plants *T. terrestris*, *B. diffusa* was administered orally at 2000 mg/kg body weight. Then the animals were observed continuously for 3 hours for general behavioral, neurological, and autonomic profiles and then every 30

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minutes for next 3 hours and finally for mortality after 24 hours till 14 days.[6,7]

Diuretic Activity

Albino rats of either sex weighing 100-150 g were divided into four groups of six animals each. The animals were fasted for 15 hours, deprived of food and water. All the animals received priming dose of a 0.9% sodium chloride solution (25 ml/kg b.w.). The first group served as control and the second group received the standard drug furosemide (20 mg/kg b.w.) in a 0.9% sodium chloride solution. The other two groups received product (UNEX capsules)-containing extracts of *B. diffusa* and *T. terrestris* at doses of 600 and 800 mg/kg body weight suspended in a 0.9% sodium chloride solution (p.o.). Immediately after the respective treatments, the animals were placed in metabolic cages (three animals in one metabolic cage) and urine was collected in the measuring cylinder up to 5 hours. During this period, no food and water was made available to animals. Then the volume of urine and Na^+, K^+ and Cl^- in urine were estimated for assessing diuretic activity.[8-11] Na^+ and K^+ concentrations were determined by flame photometer (Model-381E), and Cl^- concentration was estimated by titration with silver nitrate solution (0.17 N) using 2 ml of the ferric alum solution as indicator.[12]

Statistical Analysis

The data were expressed as mean ± SEM. The data of diuretic activity were analyzed by one-way analysis of variance (ANOVA) followed by "Dunnett's test." *P* value <0.05 was considered statistically significant.

RESULTS AND DISCUSSION

From acute toxicity studies, it was found that product (UNEX capsules) induced diuresis at a dose of 2000 mg/kg. However, there was no mortality till the end of 14 days of observation.

Product (UNEX capsules) containing the extracts of *B. diffusa* and *T. terrestris* at dose levels of 600 and 800 mg/kg body weight exhibited significant (P <0.01) diuretic activity. The product (UNEX capsules) significantly (P<0.01) increased the urine volume and concentration of Na^+, K^+ and Cl^- in urine when compared to the control group. Standard drug furosemide also exhibited significant activity [Table 1].

Diuretics relieve pulmonary congestion and peripheral edema. These agents are useful in reducing the syndrome of volume overload, including orthopnoea and paroxysmal noctural dyspnoea. They decrease plasma volume and subsequently venous return to the heart. This decreases cardiac workload, oxygen demand, and plasma volume, thus decreasing blood pressure. Thus, diuretics play an important role in hypertensive patients.[2] As diuretics are employed in the treatment of edema, it would seem to be most important to demonstrate effectiveness in the presence of electrolyte and water. Thus, excess water and electrolyte was given to simulate edema.[13]

The aim of our study was to evaluate herbal product UNEX containing the extracts of *B. diffusa* and *T. terrestris* for its diuretic potential. In the present study, the diuretic effect of orally administered product (UNEX capsules) was evaluated in normal rats at multiple doses. The furosemide, a widely used diuretic[3] in clinical practices was used as standard drug to compare the pharmacological response.

The mechanism of action by which diuresis was induced by this product (UNEX capsules) was assessed by comparing the effect with that of furosemide, a high ceiling loop diuretics. Diuresis has two components: increase in urine volume (water excretion) and a net loss of solutes (i.e., electrolytes) in the urine. The processes result from suppression of renal tubular reabsorption of water and electrolytes into the blood stream. The reference drug, furosemide, increases urine output and urinary excretion of sodium by inhibiting $Na^+/K^+/2Cl^-$ symporter (co-transporter system) in the thick ascending limb of the Loop of Henley, while thiazide diuretics inhibit the $Na^+/K^+/2Cl^-$ symporter (co-transporter system) in the distal convoluted tubule, by competing for the Cl^- binding site and increasing the excretion of Na^+ and Cl^-.[2]

In case of product (UNEX capsules), the urine output started after 2 hours of administration of product, while in case of furosemide it started just after 30 minutes of administration. The differences in the time of the onset of the diuretic action of these substances may be related to the gastrointestinal absorption characteristics of the active principle(s).

In conclusion, we conclude that the product (UNEX capsules) containing the extracts of *B. diffusa* and *T. terrestris*

Table 1: Effect of oral administration of herbal product UNEX on urine volume and electrolytic concentration

Treatment	Dose	Total urine volume (ml/5h)	Total Na^+ (ppm)	Total K^+ (ppm)	Total Cl^- (ppm)	Na^+/K^+ ratio
Normal saline	25 ml/kg	0.23 ± 0.024	318.00 ± 0.856	243.00 ± 1.211	251.50 ± 0.619	1.30
Furosemide	20 mg/kg	2.05 ± 0.022**	351.50 ± 0.763**	276.00 ± 0.760**	290.50 ± 0.428**	1.27
Product UNEX	600 mg/kg	0.40 ± 0.004**	331.00 ± 0.365**	252.67 ± 0.802**	262.83 ± 0.945**	1.31
Product UNEX	800 mg/kg	0.75 ± 0.012**	343.00 ± 1.414**	263.33 ± 1.054**	276.67 ± 0.614**	1.30

n = 6; ***P* <0.01 v/s normal control; values are expressed in mean ± SEM (ANOVA followed by Dunnett's test)

has significant effects on urinary excretion of electrolytes and support the claim of diuretic efficacy.

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