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EVALUATION OF DIURETIC ACTIVITY OF SIDDHA DRUG KUNGILIYA PARPAM (KP) IN WISTAR ALBINO RATS

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Abstract: The Siddha drug Kungiliya parpam (KP) is used in the treatment of Azhal neer churukku (urinary tract infection), Vellai (leucorrhoea), Neererivu (Painful micturition), Neerkkattu (stranguary), Vettai (gonorrhoea), Mooththira naala azharchi (inflammation of the urogenital tract), Seedha bedhi (dysentery) and Pramegam (Sexually transmitted diseases). This present study was conducted to investigate the safety and efficacy of the Siddha drug Kungiliya parpam (KP) in Wistar albino rats. The diuretic effect was found out by Lipschitz method using frusemide as standard drug. The control group was given normal saline and the two test groups are treated by Kungiliya parpam along with the adjuvant nerunjil kudineer at dose level of 100mg, 200mg**/**kg respectively. Group IV serves as standard received Frusemide (20mg/kg). Rats were kept in metabolic cages, and overnight urine was collected. Urine biochemical analysis was done by colorimetry. Total urine volume and urinary excretion of electrolytes were measured. Kungiliya parpam has produced a dose dependant increase in total urine volume when compared to control. The test drug Kungiliya parpam at the dose levels of 100 and 200 mg/kg, showed a statistically significant increase in the volume of urine with a dose dependent increase in the diuretic index to 1.92 and 2.68 respectively. The drug also confirmed a significant increase in sodium excretion in comparison to control group. An increase ($p<0.05$) in urinary excretion of potassium was also observed. The Kungiliya parpam treated rats showed high diuretic effect as compared to control but this effect was less than frusemide (Group IV). So, it was finally concluded that kungiliya parpam has good diuretic activity, but not more than standard.

Keywords: Siddha medicine, Herbal medicine, Frusemide, Urinary tract infection

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INTRODUCTION

Man has been using herbs and plant products for its medicinal use since times immemorial. The indigenous systems of medicines, developed in India for centuries, make use of many medicinal herbs[1].Herbal medicines derived from plant extracts are being progressively more utilized to treat a variety of clinical diseases, though relatively little knowledge about their mode of action is available. There is increasing interest in the health and wellness benefits of herbs and botanicals[2].Medicinal plants can be important sources of unknown chemical substances with potential therapeutic effects. Besides, the World Health Organization has estimated that over 75% of the world's population still relies on plant-derived medicines, usually obtained from traditional healers, for basic health-care needs[3]. Siddha herbs constitute an effective source for maintaining health in South India. Siddha, literally meaning the "science for soul and longevity" in olden Tamil, is the one of the oldest healing system of India, based on way of life, diet and herbs[4].Siddha system of medicine effectively treats diseases occurring in joints, skin, respiratory tract, liver, gastrointestinal tract, urogenital tract and many more ailments. Diuretic is an agent, which increases urine and solute excretion[5]. There are several classes of diuretics and they increase the excretion of water from the body through different mechanisms. They have been considered an effective treatment for diseases like hypertension, cardiac failure, nephritic syndrome and pulmonary edema[6].Urinary tract infections (UTIs) are one of the most common bacterial infections second only to infection of respiratory tract[7]. E.coli is by far the commonest cause of uncomplicated community-acquired UTIs in both outpatient and inpatient settings. Other common uropathogens are Enterococcus faecalis, Enterobacter species, Staphylococcus saprophyticus, Klebsiella pneumoniae, Proteus mirabilis and Pseudomonas species[8]. Commonly occurs due to poor sanitation, improper personal hygiene, malnutrition. Usually it is more common in females[9]. Every one of them may have experienced UTI at least once in their life time. Many indigenous drugs and Indian herbs have been claimed to have diuretic effect in Siddha system of medicine but they were not properly investigated. The present study was conducted to evaluate the diuretic activity of Siddha drug kungiliya parpam. Kungiliya parpam has been quoted in Siddha text Siddha vaithya thirattu[10]. This drug was given along with the adjuvant nerunjil kudineer. This drug has been chosen to treat Azhal neer churukku (urinary tract infection) quoted by yugi munivar[11].

MATERIALS AND METHODS:

Ingredients

a. kungiliyam (*Shorea robusta*)[12]

b. Ilaneer (*Cocos nucifera*)[12]

c. katrazhai (*Aloe vera*)[12]

SOP of the Drug:

Kungiliyam is burnt in tender coconut for 10 times and then grounded with kattrazhai juice and made into discs and dried. Then it is burnt with 10 cow dung cakes. After cooling it is taken and made into fine powder[13].

Aim of the Study:

Aim of the study is to evaluate the safety and efficacy of the Siddha drug Kungiliya parpam (KP) in Wistar Albino rats.

Experimental animals

Adult male Wistar albino rats (150-200 g) from breeding stock were used for the study. They were housed in clean and transparent poly propylene cages with three animals in each cage with 12: 12 h light-dark cycle for a period of 7days prior to the study. They were fed standard rat pellet feed and water *ad libitum*. Pelleted feed supplied by Sai meera foods Pvt Ltd, Bangalore. The experimental procedures described were approved by the Institutional Animal Ethics Committee of K.K college of Pharmacy, Gerugambakkam, Chennai- 122 (Approval no – KKCP/2013/007/CPCSEA).

Evaluation of diuretic activity:

Four groups of six male Wistar albino rats were used. First group received normal saline. Second and third group received Kungiliya parpam with nerunjil kudineer at the dose levels of 100 & 200mg/kg of body weight. The fourth group was administered frusemide 20mg/kg. Immediately after administration of the drug, the rats were placed in metabolic cages, specially designed to separate urine and fecal matter and was observed at room temperature. The animals were denied for food and water during the experiment. The urine volume (ml/day) was measured and then assayed for Na+ and K+ and Cl- concentrations in mMol/l. Diuretic index = volume of test group/volume of control group[14].

Grouping of the experimental animals:

Group I - Control - normal saline

Group II - kungiliya parpam with nerunjil kudineer (100mg)

Group III - kungiliya parpam with nerunjil kudineer (200mg)

Group IV - frusemide (20mg/kg) (standard drug)

RESULTS

Effect on urine volume

There was no evidence of dehydration and the animals were found normal at the observed 5hr and 24hr intervals. As indicated in table no I, The diuretic frusemide significantly increased the urine output when compared to control ($P < 0.01$) and the diuretic index being 4.14. The test drug at 100 and 200 mg/kg doses, showed a statistically significant increase in the volume of urine with a dose dependent increase in the diuretic index to 1.92 and 2.68 respectively. However it was less than that of frusemide (standard drug).

Effect on urinary electrolyte excretion

As indicated in table no II, the test drug, when compared to the control group, showed a significant increase in the excretion of sodium and potassium excretion in a dose dependent manner ($P <0.01$) and ($P<0.05$).

Table I: SHOWING VOLUME OF URINE

Group	Treatment	Volume of urine (ml/4hrs)	Diuretic index
I	Control	1.02±0.09	-
II	Kungiliya parpam (100mg/kg)	1.96±0.12*	1.92
III	Kungiliya parpam (200mg/kg)	2.74±1.02*	2.68
IV	Frusemide (20 mg/ kg)	4.23±1.03**	4.14

All values are expressed as mean ±S.E.M for six rats in each group. Comparisons made between control vs. treatment and treatment vs. standard ***p<0.001; **p<0.01;*p<0.05. [Diuretic index = volume of test group/volume of control group].

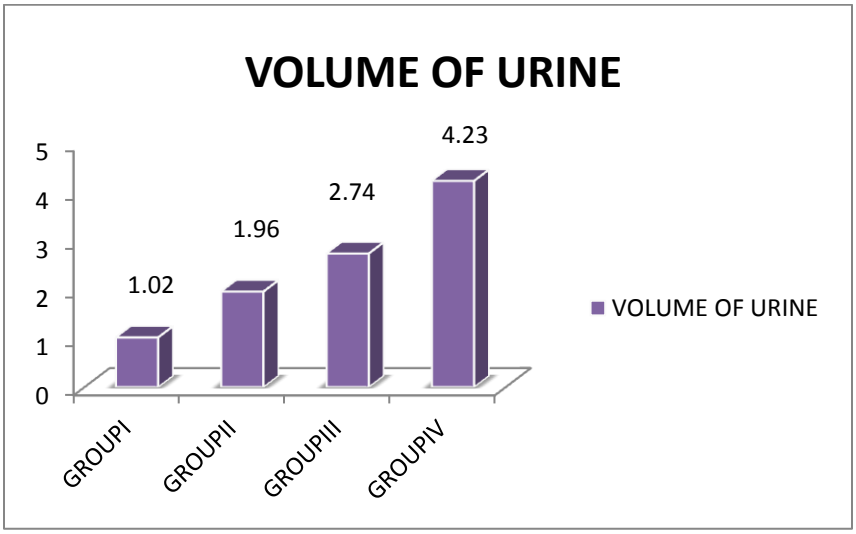
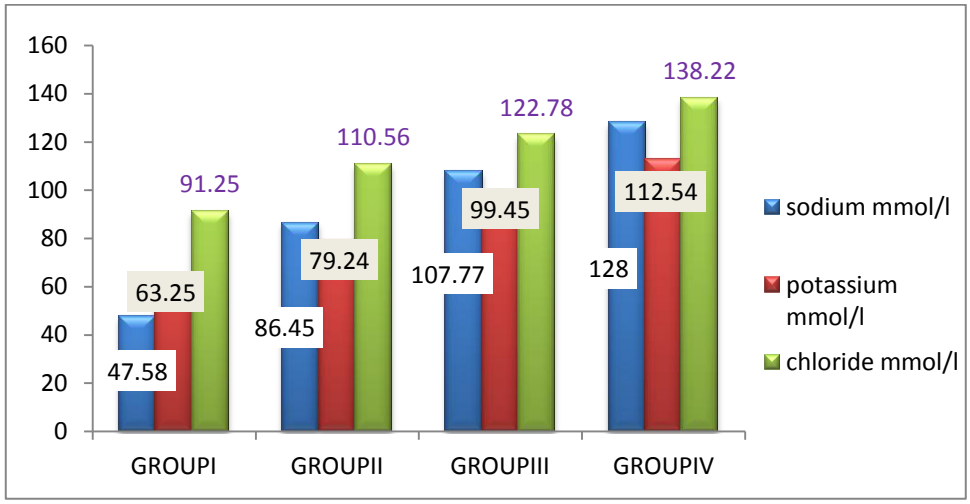


TABLE II: SHOWING VOLUME OF ELECTROLYTES

Group	Treatment	Sodium (mMol/l)	Potassium(mMol/l)	Chloride (mMol/l)
I	Control	47.58±7.45	63.25±7.23	91.25±11.02
II	Kungiliya parpam 100mg/kg)	86.45±6.54**	79.24±4.54*	110.56±12.23*
III	Kungiliya parpam (200mg/kg)	107.77±6.55**	99.45±4.56**	122.78±14.52**
IV	Frusemide (20 mg/ kg)	128±12.65***	112.54±12.21***	138.22±4.25***

All values are expressed as mean ±S.E.M for six rats in each group. Comparisons made between control vs. treatment and treatment vs. standard ***p<0.001; **p<0.01;*p<0.05.

Results expressed as mean ± S.E.M. Differences among data was determined using one-way ANOVA followed by Dunnett's test.



DISCUSSION

Diuretics are drugs that increase the rate of urine flow, sodium excretion and are used to adjust the volume and Composition of body fluids in a variety of clinical situations. Drug-induced diuresis is beneficial in many life threatening disease conditions such as Congestive heart failure, nephritic Syndrome, cirrhosis, renal failure, Hypertension, and pregnancy toxaemia[15]. Most diuretic drugs have the adverse effect on quality of life including Impotence, fatigue, and weakness. High efficacy diuretics have the drawback of causing increased excretion of potassium in urine. Hence finding out newer drug with less adverse effect and potassium sparing activity is need of hour[16, 17].

Diuresis has two components: increase in urine (water secretion) and a net loss of solutes (i.e. electrolytes) in the urine[18]. These processes result from suppression of renal tubular reabsorption of water and electrolytes into the blood stream. The reference drug frusemide, increases urine output and urinary excretion of sodium by inhibiting Na^+, K^+, 2 Cl^- symporter (co-transport system) in the thick ascending loop of Henle[19]. The control of plasma sodium is important in the regulation of blood volume and pressure; the control of plasma potassium is required to maintain proper function of cardiac and skeletal muscles[20]. The regulation of Na+/K+ balance is also intimately related to renal control of acid-base balance. The K+ loss that occurs with many diuretics may lead to hypokalemia. For this reason, generally potassium-sparing diuretics are recommended [21].

The diuretic action of kungiliya parpam was evaluated using frusemide which is a high-ceiling loop diuretic, under controlled laboratory conditions[22]. As diuretic therapy may lead to number of life-threatening electrolytic disorders and toxicities, so safety profile studies was carried out following a sub chronic administration of the drug. Results showed that there was absence of mortality and overt signs of toxicity.

The trial drug has produced a dose dependant increase in total urine volume when compared to control. A highly significant ($p<0.001$) diuretic effect was observed at doses from 200 mg/kg. Diuretic effect of the KP at 200 mg/kg was comparable to that of frusemide. Trial drug also demonstrated a significant increase in sodium excretion in comparison to control group. An increase ($p<0.05$) in urinary excretion of potassium was also observed at doses of 100 and 200 mg/kg**.**

The data in the table I, allowed with the conclusion that the trial drug acts as a diuretic because of increased urinary electrolyte concentration with significant increase in the urinary output. The increase in the ratio of concentration of excreted sodium and potassium ions for the test drug compared to control indicates that the trial drug increases chloride and sodium ion excretion to a greater extent than potassium which is essential quality of a good diuretic with lesser hyperkalaemic side effect.

CONCLUSION

The present study revealed that the trial drug Kungiliya parpam possess significant diuretic activity at the dose levels of 100 and 200 mg/kg of body weight. The experimental evidence obtained in the laboratory model could provide a rationale for the traditional use of this trial drug as diuretic. These findings fairly supported the traditional claims of the trial drug kungiliya parpam as diuretic.

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