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DIURETIC ACTIVITY OF *JALAMANJARI CHENDOORAM* IN RATS

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ABSTRACT

Aim: *In the Siddha System of medicine, innumerable drugs are available, one such valuable diuretic drug Jalamanjari Chendooram (JC) from Siddha literature, has been identified, which till now not scientifically evaluated has been chosen and a detailed study has been done to evaluate diuretic activity of the drug. Therefore the present study was planned to evaluate the diuretic potential and effect on urinary electrolytes of JC in male Wistar rats.* ***Methods****: For the evaluation of diuretic activity the methods of Lipchitz et al., 1943 and Murugesan et al., 2000 were followed. Different concentrations of JC (25 mg and 50 mg/kg of body weight) and the standard drug Furosemide (20 mg/kg) were administrated orally to hydrated male Wistar rats and their urine output was measured at several intervals of time after a single dose administration. The parameters measured for diuretic activity were urine volume at different time intervals, sodium, potassium and chloride content.* ***Results:*** *JC 50mg/kg showed remarkable increase in volume of urine, sodium, potassium and chloride content.* ***Conclusion:*** *Conclusively, JC is an effective diuretic confirming the traditional use of the drug.*

KEY WORDS

Jalamanjari Chendooram, diuretic activity, electrolytes, urine volume, furosemide.

INTRODUCTION

The most common condition which causes a major financial and emotional burden on the community is renal diseases. It is also a medical condition with limited treatment options in the modern medicine. But since ancient times innumerable complementary and alternative medicines especially Siddha system of medicines possess with it a treasure of renal protective and effective treatments and are followed here and there successfully.

One among the important renal protective drugs is the diuretic group of drugs. Diuretics increase the urine formation either by increasing the glomerular filtration rate (or) by decreasing the rate of reabsorption of fluid from the tubules. Such drugs which induce diuresis are known as diuretics. Diuretic compounds are those which stimulate water excretion potentially from our body. So diuretics play a vital role in many oedematous diseased conditions such as congestive heart diseases, nephritis, and toxemia of pregnancy also in hypertensive conditions and pulmonary congestion. The mode of action of diuretics is that they decreases cardiac work load, oxygen demand, plasma volume and thereby decreases blood pressure [1].

Diuretics cure clinical conditions like acute and chronic renal failure, hypercalciuria, and cirrhosis of liver. Though these are the good effects of synthetic diuretics, many adverse effects have also been reported. These are hyperuricaemia, acidosis, gastric irritation & high blood sugar level [2].

So there arises an emergent need to search for a safe renal protective diuretic drug and innumerable such drugs are available in Siddha literatures but yet to be standardized since it is deficit in scientific valuation. One such valuable diuretic drug *Jalamanjari Chendooram* from Siddha literature, has been identified, which till now not scientifically evaluated has been chosen and a detailed study has been done to evaluate diuretic activity in rats.

MATERIALS AND METHODS

Preparation of the drug *Jalamanjari Chendooram* [3]

The raw drugs required for the preparation of *Jalamanjari Chendooram* as mentioned in "*Yoogi Karisal - 151"* are Salt Petre, Borax, Conch shells, Alum, Ammonium Chloride, crystallized foliated Gypsum, Asbestos, Red ochre, Magnetic oxide of iron, Asphaltum, Sulphur , Iron Filings. The raw drugs were subjected to '*Suddhi'* (purification process) as per Classical Siddha text [4, 5].

The purified drugs were powdered separately. The powders were mixed and grinded again into a very fine powder.

A shallow container was heated and some amount of the powder was sprinkled in to it. The mixture first melted and then solidified. The solid was taken and allowed to cool. Similarly all the powders were used and the solidified products obtained were grinded into a very fine powder.

PHARMACOLOGICAL ACTIVITY

Drugs and Chemicals

Furosemide was procured from Himedia Laboratories, Mumbai, Other chemicals and reagents used in this study were analytical grade was purchased from SRL labs.

Preparation of stock solution

The *Jalamanjari Chendooram* was further diluted with distilled water so as to prepare 100mg/ml concentration at room temperature for oral administration by gastric intubation method.

Animal selection:

For the diuretic study, male Wistar rats weighing between 180-220 g were used. The animals were acclimatized to standard laboratory conditions (temperature: 25±2°C) and maintained on 12-h light: 12-h dark cycle. They were provided with regular rat chow and drinking water ad *libitum* (Approval number: XIII /VELS /PCOL /17 /2000 /CPCSEA /IAEC / 08.08.2012).

Evaluation of Diuretic activity:

The methods of Lipchitz *et al.,* 1943 and Murugesan *et al.,* 2000 were followed [6-8]. The screening was performed on healthy rats. Furosemide (20 mg/kg) was used as reference standard and *Jalamanjari Chendooram* were dissolved in saline solution for administration while normal saline (25 ml/kg) was used as vehicle. The rats were divided in 4 groups each containing 6 rats (n = 6). Rats were kept for fasting for 18 hrs before the study.

The control group received normal saline and test groups received 25 and 50mg/kg of *Jalamanjari Chendooram* dissolved in normal saline. The doses of *Jalamanjari Chendooram* were decided on the basis of acute toxicity study. The doses were given by oral route and rats were kept in specially designed metabolic cages for the collection of urine for 6 hrs. The urine volume during 6 hrs is measured and urine electrolyte estimation was carried out for Na^+, K^+ using flame photometer and Cl^- was estimated by titration. Na^+, K^+ estimation was carried out using flame photometry [9, 10]. The Cl^- ion concentration was estimated by titration with 0.02 N $AgNO_3$ using 5% potassium chromate solutions as indicator [11].

STATISTICAL ANALYSIS

All results were expressed as mean ± standard error. The data was analyzed statistically using ANOVA followed by Dunnet's Multiple Comparison Test.

RESULTS AND DISCUSSION

Jalamanjari Chendooram has traditional use as a diuretic, the effect of this drug, standard drug Furosemide and control group on urination and other parameters related to diuretic assay were investigated in Wistar rats and the results of the evaluation carried out were tabulated in **Table 1 & 2**.

Table 1 shows the urine volumes collected at different time intervals control group, Furosemide and trial drug *Jalamanjari Chendooram* treated orally at dose levels of 25 and 50mg/kg. **Table 2** shows the parameters related to electrolyte excretion (Na^+, K^+ and Cl^- concentrations in mMol/L).

Table-1: Showing the urine volume at different intervals in rats

Group	Treatment	Urine volume at different time intervals (in ml)				
		15 min	30 min	45 min	60 min	120 min
Control	Normal	0.27±0.04	0.51±0.02	1.06±0.05	1.02±0.08	1.54±0.22
Standard	Furosemide (20 mg/ kg)	0.34±0.05	1.46±0.1**	2.28±0.12**	3.38±0.18	4.87±0.24**
Test 1	*JC* 25mg/kg	0.25±0.03	0.74±0.01*	1.24±0.05	1.88±0.11	2.15±0.30
Test 2	*JC* 50mg/kg	0.29±0.04	0.62±0.01	1.36±0.07*	2.69±0.10	3.96±0.42**

Values are mean ± SEM, * p< 0.01, ** p< 0.05 when compared to normal saline (control)

Table 2: Effect of *Jalamanjari Chendooram* on electrolyte levels in urine

Group	Treatment	Sodium (mMol/l)	Potassium (mMol/l)	Chloride (mMol/l)
Control	Normal saline (25 ml/ kg)	62.38±0.08	92.10±1.24	10.20±1.21
Standard	Furosemide (20 mg/ kg)	104.11±0.51**	118.49±4.15**	14.34±1.74*
Test 1	*JC* 25mg/kg	87.21±1.02**	92.40±0.18	14.01±0.04*
Test 2	*JC* 50mg/kg	96.10±0.66**	92.56±2.88	13.65±0.80

Values are mean ± SEM, * p< 0.01, ** p< 0.05 when compared to normal saline (control)

Effect on urine volume

Two dose levels of *Jalamanjari Chendooram* (25 mg/kg and 50mg/kg) were selected for study and the urine volume after 15 minutes of administration of drug were found to be 0.25±0.03 and 0.29±0.04 respectively. Furosemide (20mg/kg) treated group was found to be 0.34±0.05. Urine volume after 120 minutes of administration of two dose levels of drug were found to be 2.15±0.30 and 3.96±0.42 respectively. Furosemide (20mg/kg) treated group was found to be 4.87±0.24. Furosemide treated rats showed a significant increase in volume of urine as compared to control while *Jalamanjari Chendooram* 25mg treated rats did not show any significant increase in urine volume but *Jalamanjari Chendooram* 50mg/kg showed remarkable increase in volume of urine.

Fig No.1. Effect of Jalamanjari Chendooram on electrolyte levels in urine

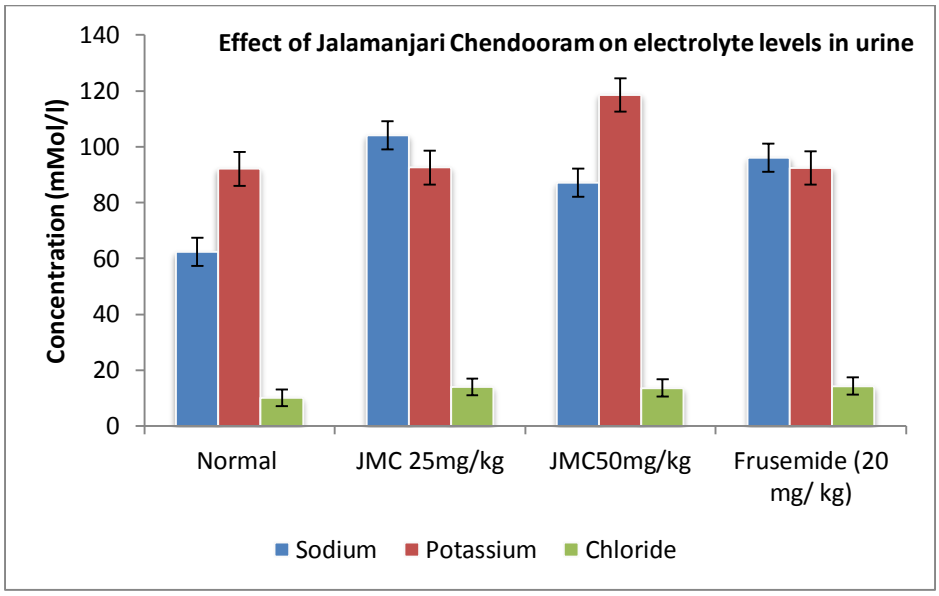
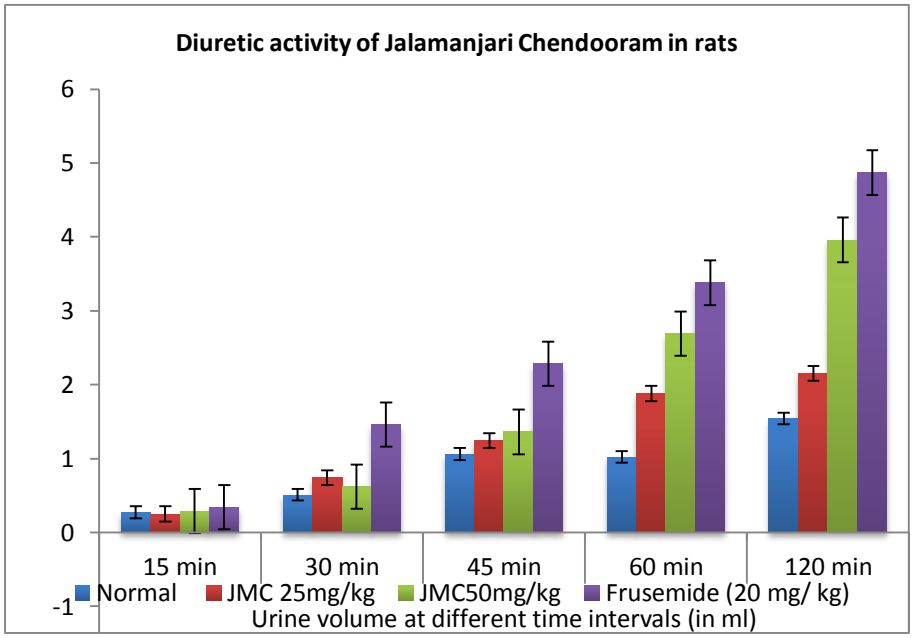


Fig No.2. Effect of urinary volume of Jalamanjari Chendooram treated rat



Effect on urinary electrolyte excretion

The effect of standard drug Furosemide and different doses of *Jalamanjari Chendooram* on electrolyte (Na^+, K^+ and Cl^-) excretion in urine is tabulated in **Table 2**.

The dose of 25mg/kg *Jalamanjari Chendooram* produced a moderate increase in Na^+, K^+ and Cl^- excretion, compared with the control group (Na^+ =87.21±1.02, K^+=92.40±0.18 and Cl^-= 14.01±0.04). The dose of 50 mg/kg *Jalamanjari Chendooram* produced a significant increase in excretion of sodium, potassium and chloride ions in the urine to an extent similar to that of

Furosemide (Na^+ = 96.10±0.66, K^+ = 92.56±2.88 and Cl^- =13.65±0.80).

CONCLUSION

From this study it can be suggested that the drug *Jalamanjari Chendooram* is an effective and significant hyponatraemic, hypochloraemic and hypokalaemic diuretic with values close to the standard drug Furosemide, which supports the claim about the *Jalamanjari Chendooram* being used as a diuretic in Siddha system of medicine. On the basis of the results of present investigation, we can conclude that *Jalamanjari Chendooram* might be a good diuretic.

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