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# STUDY OF THE DIURETIC ACTIVITY IN ETHANOLIC EXTRACT OF LEAVES OF *MORINGA OLIEFERA* IN SWISS ALBINO RATS.

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## ABSTRACT

**Objective:-**To evaluate the diuretic activity in ethanolic extract of leaves of *Moringa oliefera* and to compare the diuretic activity of ethanolic extract of leaves of *Moringa Oliefera* with that of Control and Standard. **Methods**: The study was conducted after obtaining permission from IAEC.Swiss albino mice 25-30gms of either sex were randomly selected from central animal facility,JSS Medical College, Mysore. They were divided into 3 groups of 6 mice each(n=6). The animals were fasted and deprived of food and water for 18hrs prior to the experiment]. On the day of experiment, Group 1 control-received normal saline (25ml/kg,p.o), Group 2 Standard-Furosemide 20mg/kg body weight and Group 3 animals received 100mg/kg ethanolic extract of *Moringa oliefera*. **Statistical analysis**:-The results will be analyzed by calculating the Mean values, Standard Deviation, Standard Error and one way analysis of variance (ANOVA). Post-hoc comparisons were performed by applying Scheffe' test. The values will be compared at 0.05 level of significance to test the results of the study for the corresponding degrees of freedom. $P < 0.05$ will be considered as significant. **Results**: *Ethanolic extract of leaves of Moringa oliefera* exhibited significant diuretic effect, and may prove to be effective for the treatment of many life-threatening disease conditions such as congestive heart failure, nephritic syndrome, cirrhosis, renal failure, hypertension and pregnancy toxemia.

**KEYWORDS:** Diuretic**,** Moringa oliefera, ethanolic.

## INTRODUCTION

The main function of the kidney is to maintain consistency of interior environment by eliminating waste products and by regulating the volume, electrolyte content and pH of extracellular fluid in face of varying dietary intake and varying environmental demands. Diuretics increase the excretion of sodium and water. They decrease the re-absorption of sodium and chloride from the filtrate, increased water loss being secondary to increased excretion of sodium chloride (natriuresis). This can be achieved by a direct action on the cells of nephron, indirectly by modifying the content of the filtrate. Because a very large proportion of salt and water that passes in to the tubule in the glomerulus is re-absorbed, a small decrease in re-absorption can cause a marked increase in sodium excretion. Diuretics are useful in variety of conditions such as congestive heart diseases, nephritis, nephritic syndrome, pregnancy, premenstrual tension, hypertension, pulmonary edema, mountain sickness, etc. Various side effects are associated with the present generation of anti diuretics. Loop diuretics can cause hyponatremia, hypokalemia, hypotension, hyperuricemia precipitating gout, etc. thiazide diuretics can cause hyponatremia, hypokalemia, precipitate encephalopathy in severe liver compromise, erectile dysfunction, etc. aldosterone antagonists can cause hyperkalemia, gynaecomastia, etc.[1]

Hence, a search for better drugs with lesser adverse effects, which are more efficacious and economical is need of the hour. Plants are source for various drugs. They offer an untapped potential for newer drugs. Therefore this study has been carried out to look for diuretic potential of commonly available Indian trees.

This study will evaluate the diuretic potential of ethanolic extract of leaves of Moringa oliefera (drumstick tree) Moringa oleifera is the most widely cultivated species of the genus *Moringa*, which is the only genus in the family *Moringaceae*. Common names in English include: moringa, drumstick tree , horseradish tree, ben oil tree or benzoil tree. It is a fast-growing tree, native to the southern foothills of the Himalayas in northwestern India, and in tropical and sub-tropical areas.[2, 3] The leaves, bark, flowers, fruit, seeds, and root are used to make medicine, anemia, arthritis joint pain, asthma, cancer, constipation, diabetes, diarrhea, epilepsy, stomach pain, stomach and intestinal ulcers, intestinal spasms, headache, heart problems, high blood pressure, kidney stones, fluid retention, thyroid disorders, and bacterial, fungal, viral, and parasitic infections, reduce swelling, as an aphrodisiac, prevent pregnancy, boost the immune system, increase breast milk production,

astringent, athlete's foot, dandruff, gingivitis, snakebites, warts, and wounds. The tree has an open crown of drooping, fragile branches and the leaves build up a feathery foliage of tripinnate leaves.[4, 5, 6]

Moringa oleifera has a significant source of Vitamin B, vitamin C, betacarotene, vitamin K, manganese ,protein and other essential trace metals.

Aqueous extract of various plant parts were evaluated for diuretic property. Seeds reportedly have good diuretic activity and some activity was demonstrated in roots.[5]The activity of these plants may be mostly due to the flavinoids, saponins organic acids which may inhibit tubular reabsorption of water and anions leading to diuresis.[7]

## METHODS AND MATERIALS

About 500grams of leaves was collected from the surrounding areas of Mysore, washed and dried in hot air oven. After drying it was put in 1000ml soxhlet apparatus and extracted with ethanol for 1 day. This was dried in air and powdered later.

Wistar strain albino rats weighing 200 to 250gm of either sex were obtained from the Central animal house, JSS Medical College, Mysore. Maintained on animal pellet feed from the Kamadhenu Agency, Bangalore, and tap water was given ad‑libitum. The temperature and humidity was kept at optimum, and animals were exposed to natural day-night cycles. The experiments were carried out in Department of Pharmacology, JSS Medical College, Mysore with the guidelines of the Institutional Animal Ethics Committee (IAEC) after obtaining its permission from IAEC, JSSMC/PR/IAEC/9/4420/2013-14.

## DIURETIC ACTIVITY

Lipchitz model of diuretic activity evaluation will be used.[7, 8] The selected animals were divided into three groups, each group comprising of six rats and activity was carried out. [The animals were fasted and deprived of food and water for 18hrs prior to the experiment]. On the day of experiment, the group I animals served as control, received normal saline (25ml/kg, per orally), the group II animals received 100mg/kg ethanolic extract of *Moringa oliefera*, the group III animals received Furosemide 20mg/kg body weight respectively, in normal saline. Immediately after the administration the animals were kept in diuretic cages (specially designed to separate urine and fecal matter) with a netted floor, and kept at room temperature of 25 ± 0.5º C throughout the experiment. Urine was collected

in conical flasks placed below the polythene funnel of the diuretic cages. Extreme care was taken to avoid the contamination of urine with fecal matter. The total volume of urine was collected at the end of 5hrs after dosing. During this period no water and food was made available to animals. The urine volume was measured and analyzed for Na+, K+ (cations), and Cl- (anions).The concentrations of the electrolytes in urine will be expressed in terms of mmol/L and the urine volume will be expressed in ml/5h. Diuretic index and diuretic activity will be calculated as below.

$$Diuretic\ index = \frac{Urinary\ excretion\ of\ treated\ group}{Urinary\ excretion\ of\ Control\ group}$$

$$Diuretic\ activity = \frac{Diuretic\ action\ of\ test\ drug}{Diuretic\ action\ of\ Standard\ drug}$$

## STATISTICAL ANALYSIS

The results were analyzed by calculating the Mean values, Standard Deviation, Standard Error and one way analysis of variance (ANOVA). Post-hoc comparisons were performed by applying Scheffe' test. The values were compared at 0.05 level of significance to test the results of the study for the corresponding degrees of freedom. $P < 0.05$ was considered as significant.

## RESULTS

**Table 1:- The mean urine volume and electrolyte excretion in control, Moringa Oliefera and Standard group.**

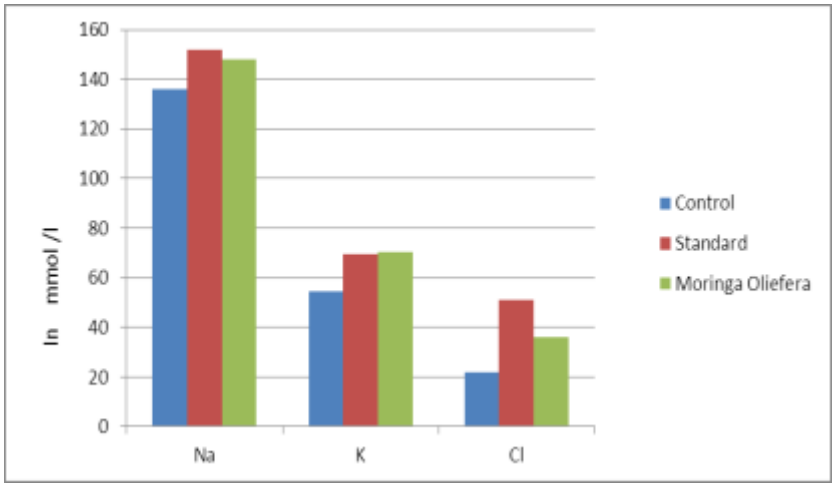
| Effect on urinary electrolyte excretion | | | | |
|---|---|---|---|---|
| **Groups** | **Urine Volume** | **Urinary electrolyte excretion** | | |
| | **Mean urine volume (ml)** | **Na+ (Meq/L)** | **K+ (meq/l)** | **Cl- (meq/l)** |
| Water control | 2.15±0.32 | 136.5 ±3.61 | 54.5 ±4.5 | 21.83 ±4.07 |
| Moringa oliefera | 12.84±1.16* | 148.16 ±2.31* | 70.16 ±3.06* | 35.83 ±2.85* |
| Standard Furosemide | 20.65±1.15 | 151.83 ±4.02 | 69.66 ±3.77 | 50.83 ±3.06 |

**Data is expressed as Mean ± SEM; *p<0.05 when compared to control.**

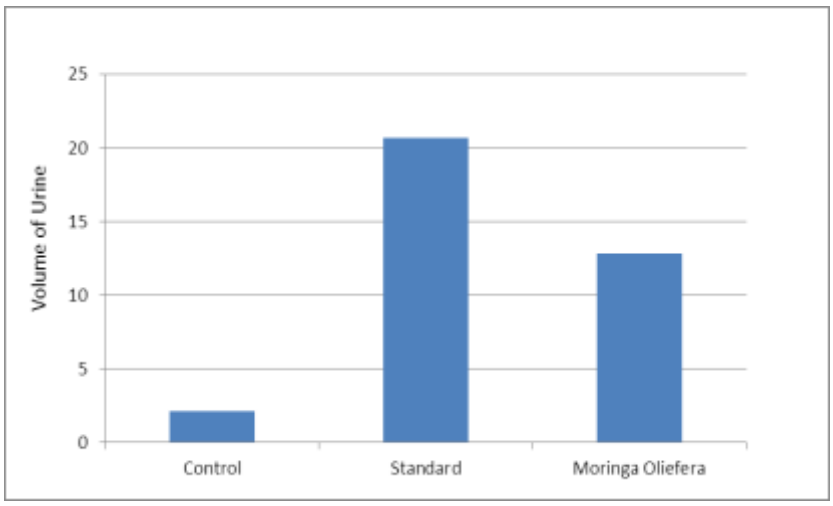
**Table 2: The diuretic index and diuretic activity in control, standard and Moringa Oliefera group**

| Group | Diuretic index | Diuretic activity |
|---|---|---|
| **Control** | **1** | **0.811** |
| **Standard** | **9.60** | **1** |
| **Moringa Oliefera** | **5.97** | **0.61** |

**Data is expressed by calculating from the above given formula.**




**Graph 1:- Electrolyte excretion in control, Moringa Oliefera and Standard group.**




**Graph 2:- The mean urine volume in control, Moringa Oliefera and Standard group**

## DISCUSSION

The present study demonstrates that the Ethanolic extract of *Moringa oliefera* showed the diuretic activity and significantly increases urinary electrolyte excretion. The observed pattern is similar to the pattern observed with furosemide group, where in increase ion sodium, potassium and chloride and urine formation is observed. Furosemide acts by inhibiting $Na^{+}$- $k^{+}$-$2CL^{-}$ symport in the thick ascending loop of Henle.

It can be suggested that the test drug may also have a similar type of mechanism of action to produce diuretic activity. The activity of *Moringa oleifera* may be mostly due to the flavonoids, saponins organic acids which may inhibit tubular reabsorption of water and anions leading to diuresis.

Table 1 showed the mean electrolyte excretion and the mean urine volume. Table 2 showed the diuretic index and diuretic activity in control, *Moringa oleifera* and standard group. Graph 1 showed the electrolyte excretion in control, *Moringa oleifera* and standard group. Graph 2 showed the mean urine volume in control, *Moringa oleifera* and standard group.

## CONCLUSION

Ethanolic extract of leaves of *Moringa oliefera* exhibited significant diuretic effect, and may prove to be effective for the treatment of many life-threatening disease conditions such as congestive heart failure, nephritic syndrome, cirrhosis, renal failure, hypertension and pregnancy toxemia.

Preliminary data presented in this report dictate that *Moringa Oleifera* may have useful diuretic activity. However further work is required to isolate and evaluate the active principle (s) for the diuretic action and also to elucidate the exact mechanism of action**.**

## REFERENCE

1. Rang H.P, Dale M.M, Ritter J.M, Flower R.J.The Kidney. In: Rang and Dale's pharmacology, Churchill Livingstone Elsevier, 6th edition: 2009, pg.368-384.
2. Jed W. F. Moringa oleifera: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophylactic Properties. Part 1. Trees for Life Journal. 2005; 1(5): 1-15.
3. Rockwood, J.L, Anderson, B.G, Casamatta, D.A. Potential uses of Moringa oleifera and an examination of antibiotic efficacy conferred by M. Oleifera seed and leaf extracts using crude extraction techniques available to underserved indigenous populations. International journal of phytothearpy research. 2013; 3 (2): 61-73.
4. Parekh J, Jadeja D, Chanda S, "Efficacy of aqueous and methanolic extracts of some medicinal plants for potent anti bacterial activity," Turkish journal of biology, 2005; 29: 203-210.
5. Senthil Velan S, Jeeva Prakash G, Sindhan V, Somasekhar E, Bharathi S, Rajani B, "Evaluation of diuretic activity of Delonix regia (Gul mohr) flowers in albino rats," International journal of research in pharmaceutical sciences., 2012; 3(3): 369-372.
6. Armando Cáceres, Amarillis Saravia Sofia Rizzo, Lorena Zabala, Edy De Leon, Federico Nave, "Pharmacological properties of Moringa oleifera: Screening for antispasmodic, antiinflammatory and diuretic activity," Journal of Ethnopharmacology.,Volume 36, Issue 3, June 1992: 233–237.

7. Pantoja CV, Chiang LCH, Norris BC, Concha JB, Diuretic, natriuretic and hypotensive effects produced by Allium sativum in anaesthesised dogs. J.ethnopharmacol, 1993; 31:325-331.
8. Lipschitz W.L, Haddin Z, Kerpscal A, bioassay of diuretics, J.Pharmacol.Exp.Ther. 1943; 79: 97-110.
9. Robert F R, Edwin K J. Regulation of renal function and vascular volume. In: Laurence L B, editor. Goodman and Gilman's the pharmacological basis of therapeutics. 12th ed. China: McGraw- Hill: 2011, p. 682-85.