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## Diuretic activity of *Moringa oleifera* leaves extract in swiss albino rats

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### Abstract

**Background:** *Moringa olifera* commonly known as drumstick belongs to the Moringaceae family. A number of medicinal properties attributed to different parts of *M. olifera*. we evaluated diuretic activity of alcoholic extract of *Moringa oleifera* leaves in swiss albino rats compared with hydrochlorothiazide.

**Methods:** In first group, six albino rats was kept as control, was given only 0.9% normal saline 25ml/kg body weight orally. Another group of 6 rats were fed with normal saline 25ml/kg along with standard hydrochlorothiazide 2.5mg/kg. The Third, fourth and fifth groups of 6 rats each were taken as test group and the crude extract of *Moringa oleifera* which was obtained in liquid form along with normal saline was given, keeping the volume constant, in doses of 50,100 and 200mg/kg bodyweight. Metabolism cage was used to collect urine in beakers for a period of 5 hours and 24 hours. Analysis of the data was done using ANOVA and Tuckey test. P values of less than 0.05 were considered significant.

**Results:** After 5 hours of urine analysis-The urinary volume of the control group was 7.3±0.2 mL and the urinary excretion of Na<sup>+</sup>, K<sup>+</sup> and Cl<sup>-</sup> are 77.7±1.2 mEq/L, 21±1 mEq/L and 262.2±0.5 mEq/L respectively. The urinary volume of the standard group was 13.37±0.95 mL and the urinary excretion of Na<sup>+</sup>, K<sup>+</sup> and Cl<sup>-</sup> are 168.4±3.39 mEq/L, 16±0.62 mEq/L and 147.46±5.79 mEq/L.

After 24 hours of urine analysis-The urinary volume of the control group was 13.7±0.5 mL and the urinary excretion of Na<sup>+</sup>, K<sup>+</sup> and Cl<sup>-</sup> are 63.72±0.56, 22.05±0.34 and 265.5±1 mEq/L respectively. The urinary volume of the Standard group was 4.13±0.73 mL and the urinary excretion of Na<sup>+</sup>, K<sup>+</sup> and Cl<sup>-</sup> are 173±45, 20.01±0.15 and 151.41±6.52 mEq/L

**Conclusion:** *Moringa oleifera* leaves extract produced dose dependant diuretic action which is greater than control lesser than hydrochloro thiazide. The extract showed dose dependent saluretic effect. On the other hand, potassium sparing activity was not observed.

**Keywords:** *Moringa olifera*, hydrochlorothiazide, Diuretic Action, Swiss albino Rats, Metabolism cage

### Introduction

*Moringa olifera* commonly known as drumstick belongs to the Moringaceae family. All parts of plant were used commonly in cooking and various home remedies. A number of medicinal properties attributed to different parts of *M. olifera* like leaf, fruit, flowers, root, bark and seed oil have been used for mixture of ailments have been recognized by Ayurvedic and urani medicines [1-3]. There are various biological properties ascribed to different parts of *M. olifera* have been reviewed in scientific articles [4-5]. The leaves of *M. oleifera* have been reported to be a valuable source of both macro- and micronutrients, rich source of β-carotene, protein, vitamin C, calcium, and potassium and act as a good source of natural antioxidants [6-7] to this purpose we evaluated diuretic activity of alcoholic extract of *Moringa oleifera* leaves in swiss albino rats compared with hydrochlorothiazide.

### Methods

Adult swiss albino rats of both sexes weighing between 175-225 gm were used. Animals were maintained between 27-29 °C room temperature was. Institutional Animal Ethical Committee has approved the study protocol. All the animals were hydrated with 25 ml/kg of 0.9% normal saline. 1<sup>st</sup> group of 6 rats was kept as control, was given only 0.9% normal saline 25 ml/kg body weight orally. Another group of 6 rats were fed with normal saline 25 ml/kg along with standard hydrochlorothiazide 2.5 mg/kg. Hydrochlorothiazide tablet was powdered and made as solution with normal saline. The Third, fourth and fifth groups of 6 rats each were taken as test group and the crude extract of *Moringa oleifera* which was obtained in liquid form along with normal saline was given, keeping the volume constant, in doses of 50,100 and 200 mg/kg bodyweight. Freshly collected leaves were cut into small pieces and shade dried. The dried

leaves were then finely powdered using a domestic food processor. The powdered leaves were extracted with 70% Alcohol and 30% distilled water by a process Soxhlet extraction. The urine was collected in beakers for a period of 5 hours. The rats were not given food or water during the experiment. At the end of 5 hours, the bladder of each rat was emptied by pulling the tail at the base, to collect residual urine. Urinary Volume is estimated by placing a beaker at the bottom exit of the funnel of Metabolism Cage. A strainer is placed on the beaker, which prevents contamination of urine with faecal matter. Urinary Sodium, Potassium and Chloride were measured using Spectrophotometer.

**Experimental Design:**

- Group-I (Control) - Normal saline 25 ml/kg
- Group-II (Standard) – Hydrochlorothiazide 25 mg/kg
- Group-III (Test I) - *Moringa oliefera* leafs extract 50 mg/kg
- Group-IV (Test II) - *Moringa oliefera* leafs extract 100 mg/kg
- Group-V (Test III) - *Moringa oliefera* leafs extract 200 mg/kg

**Statistical Analysis:** Analysis of the data was done using ANOVA and Tuckey test.

P values of less than 0.05 were considered significant.

**Results**

*Moringa oleifera* leaves extract produced dose dependant diuretic action which is greater than control lesser than hydrochloro thiazide. The extract showed dose dependent saluretic effect. At higher doses of leaf extract resulted in excess loss of potassium as compared to the natriuretic activity lower doses, suggesting that the leaf extract has no potassium sparing effect. However large studies are required to warranted use a diuretic in humans. However, potassium sparing activity was not observed.

**After 5 hours of urine analysis-**The urinary volume of the control group was 7.3±0.2 mL and the urinary excretion of Na<sup>+</sup>, K<sup>+</sup> and Cl<sup>-</sup> are 77.7±1.2 mEq/L, 21±1 mEq/L and 262.2±0.5 mEq/L respectively. The urinary volume of the standard group was 13.37±0.95 mL and the urinary excretion of Na<sup>+</sup>, K<sup>+</sup> and Cl<sup>-</sup> are 168.4±3.39 mEq/L, 16±0.62 mEq/L and 147.46±5.79 mEq/L. There was increase in urinary volume excretion with 50 mg and decrease with 100 and 200mg of test drug as shown in Table-I which is significant when compared

to control group, and there is highly significant increase in sodium and chloride excretion with 100 and 200mg of test drug. The excretion of chloride with 50mg of test drug is less but significant when compared to control group. There was decrease in potassium excretion with 50 and 100 mg/kg which is significant when compared to control group shows potassium sparing effect of test drug in above doses. The excretion of potassium with 200 mg/kg of test drug is high when compared to control group which indicates that high doses of test drug do not have potassium sparing effect.

**After 24 hours of urine analysis-**The urinary volume of the control group was 13.7±0.5 mL and the urinary excretion of Na<sup>+</sup>,K<sup>+</sup> and Cl<sup>-</sup> are 63.72±0.56, 22.05±0.34 and 265.5±1 mEq/L respectively. The urinary volume of the Standard group was 4.13±0.73 mL and the urinary excretion of Na<sup>+</sup>,K<sup>+</sup> and Cl<sup>-</sup> are 173±45,20.01±0.15 and 151.41±6.52 mEq/L. There was decrease in urinary volume excretion with 50,100 and 200mg of test drug which is 1.6±0.2, 2.95±0.25 and 3.25±0.25 mL but significant when compared to control group, and there is highly significant increase in sodium excretion with 50, 100 of test drug but with 200mg dose, sodium excretion is decreased, but when compared to control group it shows highly significant value. The excretion of chloride with 50, 100 and 200mg of test drug is increased. There was increase in potassium excretion with 100,200 mg/kg but with 50mg/kg dose potassium excretion is decreased which is significant when compared to control group. It shows low doses of test drug shows less potassium loss. The excretion of potassium with 200mg/kg of test drug is high when compared to control group which indicates that high doses of test drug produces higher potassium lose.

**Saluretic and Natriuretic activity** – The sum of Na<sup>+</sup> and Cl<sup>-</sup> excretion is calculated as parameter for Saluretic activity. <sup>[8]</sup> The ratio of Na<sup>+</sup>/K<sup>+</sup> is calculated for Natriuretic activity. Values greater than 2.0 indicate a favorable Natriuretic effect. Ratios>10.0 indicates potassium-sparing effect. We observed dose dependent increase in Saluretic activity as shown in table-2. However, the Natriuretic activity is highest with 50 mg/kg and compared to 100 & 200 mg is significant. As the ratio are less than 10, k<sup>+</sup> sparing effect we did not observed any k<sup>+</sup> sparing effect with all three doses of AEMOL.

**Table 1:** The dose dependent effect of test drug on urinary volume, Na<sup>+</sup>, K<sup>+</sup> and Cl<sup>-</sup> excretion in Rats

Groups (n=6)	Ph	Volume ( mL)	Sodium (meq/L)	Potassium (meq/L)	Chloride (meq/L)
<b>After 5 Hours</b>					
Group-I	8	7.3±0.2	77.74±1.2	21±1	262.2±0.5
Group-II	8	13.37±0.95	168.4±0.62	16±0.62	147.46±5.79
Group-III	7	8.25±0.25*	102.5±0.5**	14.4±0.6*	197±1**
Group-IV	6	4.75±0.25*	162.5±0.5**	19±1	257±3
Group-V	6	4.35±0.15**	52.5±2.5*	33.2±0.8*	312±3**
<b>After 24 Hours</b>					
Group-I	9	13.7±0.5	63.72±0.56	22.05±0.34	265.5±1
Group-II	8	4.13±0.73	173.45±6.10	20.01±0.15	151.41±6.52
Group-III	6	1.6±0.2**	166.5±1.5**	19.65±0.25*	346.5±1.5**
Group-IV	6	2.95±0.25**	164±1**	24±1	447.5±3.5**
Group-V	6	3.25±0.25**	152.5±2.5**	37.9±0.6**	312±3**

\*= significant, \*\*= Highly significant, Data represented as Mean±SEM.

**Table 2:** Saluretic & Natriuretic effect of *Moringa oleifera* Leaves

Alcoholic Extract	Saluretic activity	Natriuretic activity
Group-III	513	8.5*
Group-IV	614	7.08*
Group-V	624	4*

### Discussion

Various phytoconstituents were responsible for diuretic activity which includes alkaloids, glycosides, tannins, phenolics coumarins, triterpenoids etc. Natural Diuretics acts by increasing the urine output as well as urinary electrolyte concentration. These phytoconstituents present in plant exert desired pharmacological effect on body and thus act as natural diuretic. *Moringa oleifera* might be involved in the mechanism of diuretic activity<sup>[8-9]</sup>. Caceres A *et al*<sup>[10]</sup> in his study found that *Moringa oleifera* leaves extract leaves showed feature of diuretic action. Our study results were also supported by Vivek Kumar Gupta<sup>[11]</sup> which he mentioned in his review study that Decoction of *Moringa oleifera* leaves extract leaves will have diuretic action.

### Conclusion

*Moringa oleifera* leaves extract produced dose dependant diuretic action which is greater than control lesser than hydrochloro thiazide. The extract showed dose dependent saluretic effect. On the other hand, potassium sparing activity was not observed.

**Conflict of Interest:** None

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