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# DIURETIC ACTIVITY OF METHANOLIC EXTRACT OF LEAVES OF *Pedalium murex* L

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## ABSTRACT

The present study was undertaken to investigate the diuretic effect of ethnolic extract of the dried plant of *Pedalium murex* in normal rats. Ethanolic extract of *Pedalium murex* plant was administered to experimental rats orally at the doses of 50 and 100 mg/kg p.o. Thiazide (150 ug/kg) was used as positive control in the study. The diuretic effect of the extract was evaluated by measuring urine volume & sodium and potassium content. Urine volume was significantly increased by ethanolic extract in comparison to the control group, while the excretion of sodium was also increased by extract. The ethanolic extract had the additional advantage of a potassium-conserving effect. We can conclude that ethnolic extract of *Pedalium murex* produced notable diuretic effect which appeared to be comparable to that produced by the reference diuretic

thiazide. The present study provides a quantitative basis for explaining the folkloric use of Pedalium murexas a diuretic agent.

**Keywords: Diuretic activity, Pedalium murex, Thiazide, medicinal plants**

## INTRODUCTION

*Pedalium murex* is a small herb belonging to family Pedaliaceae, commonly known as 'Anai nerinji, peru nerunji' and is widely distributed in It is distributed in tropical Africa, Ceylon, India, Mexico and Pakistan. It is a common herb grows throughout India but it is found commonly along the western and corommandal coasts as a weed of waste places. It also occurs in Delhi, Rajasthan and Punjab, Tamil Nadu and Gujarat and Deccan peninsula **[1, 2]**.

According to Indian system of medicine ( Siddha and Ayurveda), *Pedalium murex* is cooling tonic, aphrodisiac, improves appetite and useful in strangury, urinary discharges, vesicular calculi, cough, asthma, pain, cures skin diseases and heart troubles, piles, leprosy. It purifies blood, diuretic, removes stone in the bladder. According to Unani system of medicine, it is diuretic, cures strangury, gleet, gonorrhea, lumbago, tonic, enriches blood, increases mensural flow, good gargles for mouth troubles and painful gums, stomachic, appetizer, emmenagogue etc **[3, 4]**.

## MATERIALS AND METHODS

Collection of leaves of the *Pedalium murex* plant was done from the different areas around Puducherry India, in the month of Jan to March 2014. Taxonomic identification of the plant has been done by the Dr. R.Sridharan, Nodal Officer Siddha , Department of Indian Systems of Medicine and Homeopathy, Govt of Puducherry. Whole plant of the *Pedalium murex* plant was dried in shade for 10–12 days. After complete drying, the plant was pulverized to a coarse powder of 40 mesh size in a mechanical grinder.

**Extraction Procedure:** The leaves were powdered to obtain a methanolic extract and then defatted with petroleum ether at 60–70 $^{o}$C. The powdered material was then air-dried and subjected to sohxlet extraction for 18 h at 50–55$^{o}$C. The extract was thereafter concentrated under vacuum and air-dried **[5, 6]**.

**Animals:** Adult male Wistar rats, each in the weight range of 180–200g, were obtained from the Animal House. The animals were randomly allocated to six treatment groups of 6 animals each and kept in cages and housed under standard conditions of temperature, humidity and dark light cycle (12h–12h).

**Experimental protocol:** Diuretic activity was determined by the following methods of Kau et al., with minor modifications. The rats were randomly divided into four groups of six animals each as follows: (1) Control – given 5 ml/kg body weight of de-ionized water; (2) methanol extract – 200 mg/kg body weight; (3) methanol extract – 400 mg/kg body weight; and (4) Thiazide – 150 ug/kg body weight (Abdala, 2008; Martín- Herrera, 2008). In all cases, the volume of the dose was administered 5 ml/kg body weight. The animals were fasted overnight (18 h) prior to the test but with free access to tap water only and then were given an oral loading of normal saline (0.9%) of 0.05 ml per g body weight. Immediately after administration, the rats were paired and placed in metabolism cages. Urine was collected in a graduated cylinder and its volume was recorded at 2 h intervals for 8 h. Cumulative urine excretion was calculated in relation to body weight and expressed as ml/100 g b.w. Electrolyte ($Na^+$ and $K^+$) concentrations estimated (as described below) from the urine sample of each pair of rats at the end of the experimental period (8 h) and expressed as mequ/100 g b.w.

**Measurement of Urine Output and Analysis of Electrolytes:** $Na^+$ and $K^+$ concentrations were measured using flame photometer (Toshniwal, Model TCM-35). The instrument was calibrated with standard solutions containing different concentrations of $Na^+$ and $K^+$.

**Statistical Analysis:** The results are expressed as mean values ± S.E.M. (standard error of mean) for pairs of rats. Statistical comparison was carried out by analysis of variance (ANOVA) followed by Turkeys test to find out the level of significance using SPS software. The difference between the means of treated groups and the non-treated control group were considered statistically significant when $P < 0.05$.

**RESULTS AND DISCUSSION**

The results of the evaluations carried out on the extracts are listed in Table 1 and Table 2. **Table 1** shows the urinary volume (ml/100g/8h) while **Table 2** shows the electrolyte ($Na^+$ and $K^+$) content (mequiv/100g/8h) of the urine of the animals.

**Urine volume: Table 1** shows that the reference diuretic, HCTZ, increased urine volume by 54%. The extract also caused an increase in urine volume. For the methanolic extract, the increase at doses of 200 mg/kg body weight and 400 mg/kg body weight was 18 % ($P < 0.01$) and 41 % ($P < 0.001$), respectively, compared to the control group.

**Electrolyte excretion:** Only 100 mg/kg

of the methanol extract produced a significant increase in $Na^+$ excretion ($P < 0.001$) when compared to the control group. Only HCTZ produced significant increases in potassium excretion.

According to a previous survey carried out, the leaves of *Pedalium murex* largely used for the treatment of hypertension and renal disease, but to the best of our knowledge, no previous pharmacological or clinical study has been carried out to test the diuretic activity of this plant. Methanolic extract of *Pedalium murex* shows a dose-dependent increase in urine excretion. The methanol extract (400 mg/kg) shows an increase of 41.05 % grouping urine volume. Thus, the diuretic effect of extract indicates an increase in both water excretion and excretion of sodium. Methanolic extract (400 mg/kg) shows a significant result in excretion of water & sodium, which proves as a strong diuretic agent, but active constitute responsible for the diuretic effect cannot be concluded on the basis of this study. The preliminary phytochemical investigation reveals the presence of phytosterol, alkaloids in methanol extract which can be responsible for diuretic activity but need to be confirmed by a further study **[7-9]**.

**Table 1: Effect of Oral Administration of Methanol Extract of *Pedalium murex* and HCTZ on Urine Volume, Diuretic Index**

| Treatment | Dose (mg/kg b) | Urine volume (ml/100g/hr) | Diuretic Index |
|---|---|---|---|
| Control | – | 4.25 ± 0.23 | – |
| Thiazide | 150 ug | 7.38 ± 0.28*** | 1.4987 |
| *Pedalium murex* (MeOH) | 200 | 5.71± 0.14** | 1.172 |
| *Pedalium murex* (MeOH) | 400 | 6.50 ± 0.124*** | 1.3987 |

**$^{**}p < 0.01$ and $^{***}p < 0.001$ compared with the control group (Bonferroni Multiple Comparisons Test). Diuretic index = volume treated group / volume control group**

**Table 2: Effect of Oral Administration of Methanol Extract of *Pedalium murex* and HCTZ on Sodium and Potassium Excretion in Urine**

| Treatment | Dose (mg/kg b) | Sodium (meq./100g/8 hr) ×10-2 | Potassium (meq./100g/8 hr) ×10-2 |
|---|---|---|---|
| Control | – | 54.26 + 1.62 | 17.10 + 1.47 |
| Thiazide | 150 ug | 91.48 + 1.24*** | 29.76 + 1.85*** |
| *Pedalium murex* (MeOH) | 200 | 60.25 + 1.43 | 17.73 + 1.60 |
| *Pedalium murex* (MeOH) | 400 | 78.77 + 1.29*** | 18.93 + 1.17 |

**$^{**}p < 0.01$ and $^{***}p < 0.001$ compared with the control group. (Bonferroni Multiple Comparisons Test). thiazize.**

## CONCLUSION

The results obtained in this study provide a quantitative basis to explain the traditional folkloric use of *Pedalium murex* as a diuretic agent.

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