



EVALUATIONS OF DIURETIC ACTIVITY OF METHANOLIC EXTRACT OF *PHYSALIS ANGULATA* L. LEAVES

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ABSTRACT

The study was undertaken to investigate diuretic activity of Methanolic leaf extract of *Physalis angulata* L (MLEPA) in rats. *Physalis angulata* leaves are traditionally used for the diuretic activity. MLEPA were administered to experimental rats orally at doses of 250, 500 and 1000 mg/kg p.o. furosemide (20 mg/kg) was used as positive control in study. The diuretic effect of the extract was evaluated by measuring urine volume & excretion of sodium, potassium and chloride ion content. Urine volume was significantly increased by methanolic extract in comparison to control group. While the excretion of sodium, potassium and chloride ions increased by extract (1000mg/kg). We can conclude that MLEPA produced notable diuretic effect which appeared to be comparable to that produced by the reference diuretic furosemide. The present study provides a quantitative basis for explaining the folkloric use of *Physalis angulata* L. as a diuretic agent.

Keywords: *Physalis angulata* L, Diuretic activity, furosemide.

INTRODUCTION

Diuretics are chemicals that increase the rate of urine formation. It enhances the selective excretion of various electrolytes and water by affecting renal mechanism of tubular secretion and reabsorption¹. Drug-induced diuresis is beneficial in many life-threatening disease conditions such as congestive heart failure, nephritic syndrome, cirrhosis, renal failure, hypertension, and pregnancy toxemia². *Physalis angulata* L is an herb belongs to family of Solanaceae. The Plant prefers moist drained sandy loamy soil with full sun or partial shade; it is renowned as an effective stimulant for the immune system. The juice is used in the treatment of earache, jaundice, fever, bladder diseases etc. Some recent studies on the biological activity of *Physalis angulata* L showed that the plant possesses molluscicidal activity³, anti microbial activity⁴, antiasthmatic activity⁵, leishmaniasis⁶ and vector control activities⁷. There is no report on the diuretic studies of the extract of dried leaves of *Physalis angulata* L. so far, though it is used in folk medicine. Thus it was considered worthwhile to take up such an investigation in detail. The present study was carried out to evaluate the diuretic activity of methanolic extracts of *Physalis angulata* L leaves.

MATERIALS AND METHODS

Materials

The plants of *Physalis angulata* L. of the family Solanaceae were obtained from chengalpattu area surroundings, Tamilnadu, India. The Authenticity of the plant species was confirmed by Professor P.Jayaraman, Ph.D. director of National institute of Herbal science, Chennai. The plant leaves were dried and ground to

sawdust form, which was then kept in air-tight brown bottle until use.

Drugs and Chemicals

Furosemide inj. (Aventis laboratories limited), Normal Saline, Methanol, AgNO₃, Carboxyl Methyl Cellulose (CMC).

Preparation of Plant Extracts

The dried leaves powdered of *Physalis angulata* L was extracted with methanol, by maceration method for 72hrs at room temperature. The extracts were filtered while the residue was further extracted under the same condition and extracts was concentrated by simple evaporation under reduced pressure. The percentage yield was found to be as 11.2%.

Experimental animals

Swiss albino rats weighing (150-200 gm) were procured from National institute of nutrition (Hyderabad). They were housed in the departmental animal house under standard conditions (26 ± 2°C and relative humidity 30-35%) in 12 hours light and 12 hours dark cycle respectively for 1 week before and during the experiments. Animals were provided with standard rodent pellet diet and had free excess to water. The experimental rats were all handled in strict compliance with international guidelines as prescribed by CPCSEA.

Preliminary phytochemical screening

A portion residue from extract was subjected for phytochemical analysis in order to see the presence of alkaloids, flavonoids and glycosides⁸.



Evaluation of diuretic activity

Lipschitz test described by Lipschitz et.al (1943) was employed for assessment of diuretic activity. In this method, albino wistar rats of either sex weight 150 to 200gm were used. The rats were divided five groups of six animals each. The animals were fasted for 24 hours prior to the experiment and water was given ad libitum during fasting⁹.

First group received normal saline (25ml/kg, i.p),

Second group received furosemide (20mg/kg, i.p),

Third, fourth and fifth groups received MLEPA (250, 500, 1000mg/kg, p.o.) respectively.

After administration the animals were placed in a metabolic cage (2 per cage), specially designed to

separate urine and collected was measured at the end of 5hours. During this period, no food and water was made available to animals. The parameter was taken volume of urine; electrolytes (Na^+ , k^+ , Cl^-) were estimated in urine for assessment of diuretic activity. The Na^+ , k estimated was carried out using flame photometry. The Cl^- ion concentration was estimated by titration with 0.02N AgNO_3 using 5% potassium chromate solution as indicator.

Statistical analysis

All results are expressed as mean \pm standard error. The data was Analyzed using one ways of analysis of variance (ANOVA). The statistical significance of the different of the means was evaluated by Dunnett's test.

Table 1: Diuretic Effect of methanolic extracts of *Physalis angulata* in rats

Treatment	Urine volume (ml/100g/5h)	Na^+ (mmol/L)	K^+ (mmol/L)	Cl^- (mmol/L)
control	3.51 \pm 0.48	102.20 \pm 1.16	92.18 \pm 0.73	56.22 \pm 5.18
Furosemide 20mg/kg	7.32 \pm 0.28*	122.62 \pm 0.14*	62.04 \pm 2.14***	74.24 \pm 1.62*
MLEPA 250mg/kg	4.42 \pm 0.24 ^{ns}	109.46 \pm 3.47 ^{ns}	71.20 \pm 2.10*	56.28 \pm 3.16
MLEPA 500mg/kg	5.68 \pm 0.26*	110.24 \pm 3.14*	71.62 \pm 1.18 ^{ns}	61.72 \pm 5.2 ^{ns}
MLEPA 1000mg/kg	6.54 \pm 0.62*	110.24 \pm 3.14*	72.40 \pm 1.30*	63.46 \pm 5.46*

Values are expressed as mean \pm S.E.M; n=6, *P<0.05, **P<0.01, ***P<0.001 considered for significance, (ANOVA followed by Dennett's test).

RESULTS AND DISCUSSION

The data in the Table-1 revealed that, MLEPA significantly increases the urinary output as well as urinary ion concentration at higher doses.

As mentioned in table, the diuretic drug like furosemide and MEPAL (250 mg/kg, 500 mg/kg and 1000 mg/kg) of Urine volume were 7.32 \pm 0.28*, 4.42 \pm 0.24^{ns}, 5.68 \pm 0.26* and 6.54 \pm 0.62* respectively. Estimation of Na^+ (m mol/L) of the diuretic drug like furosemide and MEPAL (250 mg/kg, 500 mg/kg and 1000 mg/kg) 122.62 \pm 0.14*, 109.46 \pm 3.47^{ns}, 110.24 \pm 3.14* and 110.24 \pm 3.14* were respectively. Estimation of K^+ (m mol/L) of the diuretic drug like furosemide and MEPA (250 mg/kg, 500 mg/kg and 1000 mg/kg) were 62.04 \pm 2.14*, 71.20 \pm 2.10*, 71.62 \pm 1.18^{ns} and 72.40 \pm 1.30* respectively. Estimation of Cl^- (m mol/L) the diuretic drug like furosemide, and MEPA (250 mg/kg, 500 mg/kg and 1000 mg/kg) were 74.24 \pm 1.62*, 56.28 \pm 3.16, 61.72 \pm 5.2^{ns} and 63.46 \pm 5.46* respectively. The diuretic activities of the extracts were significant (P < 0.05) when as compared to control.

The methanolic extract was found to produce significant increases in excretion of Na^+ , K^+ and Cl^- ions at the higher doses tested (1000mg/kg p.o). The order of activity of increases of urinary output was 1000mg >500mg >250mg. The diuretic activity demonstrated by the test extract of 1000mg/kg was significantly lesser than standard drug furosemide (20mg/kg).

The graded doses of the MLEPA in normal saline showed a very significant increase in diuresis, natriuresis, kaliuresis, GFR. All the extracts cause increase urine

elimination and increase in Na^+ , K^+ and Cl^- excretion as compared to normal saline. The extracts possibly act by the synergistic action mechanism of the $[\text{HCO}_3^-/\text{Cl}^-]$, $[\text{HCO}_3^-/\text{H}^+]$ exchangers and the $[\text{N}^+/\text{H}^+]$ antiporter, to cause diuresis. There was an increase in the ratio of concentration of excreted sodium and potassium ions after MEPAL treatment.

The preliminary phytochemical test revealed the presence of flavonoid, amino acids, glycosides, and alkaloids in the methanolic extract of *Physalis angulata* leaves. It is reported previously that the flavonoid and glycosides are endowed with diuretic activity¹⁰. It may therefore be presumed here that the diuretic activity is due to presence of flavonoids in the test extract. Our future aim is to isolate the chemical constituents responsible for the diuretic activity.

CONCLUSION

Methanolic leaf extract of *Physalis angulata* L. increased urine volume significantly and also potentiate excretion of Na^+ in urine output, thus the results obtained in this study provides a quantitative basis to explain the traditional folkloric use of *Physalis angulata* L. as a diuretic agent.

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