Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Der Pharmacia Lettre, 2012, 4 (6):1832-1834
(http://scholarsresearchlibrary.com/archive.html)

Scholars Research Library
ISSN 0975-5071
USA CODEN: DPLEB4

Diuretic activity of methanolic extract of *Physalis minima* leaves

[*]Jyothibasu Tammu, K.Venkata Ramana, Sreenu Thalla, Ch Narasimha raju Bh

Department of Pharmacology, A. S. N. Pharmacy College, Tenali, Andhra Pradesh, India

---

ABSTRACT

Physalis minima is a common Physalis species found in India, especially leaves are used as medicine. According to Ayurveda, Physalis minima used as antibacterial, analgesic, anti-inflammatory, diuretic. The present study was undertaken to investigate diuretic effect of petroleum ether extract of the Physalis minima in albino rats. MEPM (Methanolic Extract of Physalis minima) were administered at the doses of 100 and 200 mg/kg, p.o. Furosemide (500 mg/kg, p.o) was used as positive control in study. The diuretic effect of the extract was evaluated by measuring urine volume, sodium and potassium content. Urine volume is significantly increased at two doses of MEPM 100 and 200 mg/kg body wt in treated rats. The excretion of sodium, Potassium levels was also increased by the MEPM. The diuretic effect of the extract was similar to furosemide. The MEPM had the additional advantage of chloride conserving effect. This study concludes that MEPM produced notable diuretic effect which appeared to be comparable to that produced by the standard diuretic furosemide. The present study provides a quantitative basis for investigating the use of Physalis minima as a diuretic agent.

Key words: *Physalis minima*, diuretic activity, urine output

---

INTRODUCTION

Diuretic compounds that stimulate the excretion of water are potentially useful in many disorders including most of those exhibiting oedema such as congestive heart diseases, nephritis, pregnancy, premenstrual tension, hypertension. And also play an important role in hypertensive patients & pulmonary congestion [1]. Diuretics like mannitol, thiazides, frusemide and ethacrinic acid are used in now days. Among these diuretics had some toxic effects, these synthetic diuretics typically inhibit potassium secretion and leads to potassium retention [2]. Plants may serve as the alternative sources for the development of new diuretic agents due to their biological activities. Several plants used for the treatment of diuresis in different systems of traditional medicine have shown diuretic activity when tested on animal models. *Physalis minima* especially leaves used as diuretic, analgesic, antibacterial, anti-inflammatory [3]. On the basis of the traditional use of the plant as a diuretic, but no previous pharmacological or clinical study was carried out to test the diuretic activity of this plant. Since the diuretic effect of *Physalis minima* has never been experimentally confirmed, the main aims of the present investigate the diuretic activity of *Physalis minima* in rats.

MATERIALS AND METHODS

Plant material

Physalis minima purchased from nursery of Government Siddha Medical College, Arumbakkam, Chennai, India. Its botanical identification was done by Dr. Jayaraman, Director, Plant Anatomy Research Centre, Tambaram, Chennai.

The voucher specimen (281/TN/2010) was deposited at the herbarium, Department of Botany, Presidency College, Chennai, India.

Preparation of extract

The fresh leaves were shade dried, powdered and extracted (200 g) successively with 600 ml of methanol (60–80^{0}C) in a soxhlet extractor for 18–20 hrs [4]. The extract was concentrated to dryness under reduced pressure and controlled temperature (40–50^{0}C) to form a dark brown solid, weighing 500 mg (25 % w/w). Methanol extract of *Physalis angulata* was tested for its phytochemical screening [5].

Animals

Albino Wistar rats of either sex, weighing 150–200 g, were used in the study. They were kept in standard laboratory conditions under natural light and dark cycle, and are housed at ambient temperature (22±1°C), relative humidity (55±5%). Animals had access to standard pellet diet and water given *ad libitum*. IAEC/134/2010.

Evaluation of diuretic activity

For the evaluation of diuretic activity the animals were divided into four groups. Group-I was received only with saline solution i.e. Normal control. Group-II was received furosemide at a dose of 500 mg/kg, p.o. and it was considered as positive control group. Group-III & Group-IV received the MEPM, at doses of 100 and 200mg/kg, (p.o) respectively [6]. Twenty–four hours prior to the experiment, the test animals were placed into metabolic cages with total withdrawal of food and water. After oral administration of MEPM, the urinary output of each group was recorded at different time intervals from the graduated urine chamber at metabolic cage. Urine samples were analyzed for Na^+ and K^+ concentration by flame photometric method.

Experimental design

Animals were deprived of food and water 18h before the experiment. They were hydrated with 5ml/kg of water prior to drug/extract administration. Immediately after dosing, animals were placed in metabolic cages [7], specially designed to separate urine and faeces. The urine was collected in measuring cylinder up to 5 h after dosing. During this period, animals were deprived of food and water. The parameters measured were total urine volume, urine concentration of Na^+, K^+ and Cl^-. Concentration of Na^+ and K^+ were determined using Flame photometer while Cl^- concentration was estimated titrimetrically using 0.02N $AgNO_3$ with 5% potassium chromate as indicator. Appearance of brick red precipitate was taken as the end point [8].

Statistical analysis

The data were expressed as Mean ± S.E.M. and statistically analyzed using one way ANOVA followed by Dunnet,s t-test, $p<0.05$ was considered significant.

RESULTS AND DISCUSSION

The diuretic activities of the extracts were significant ($P < 0.05$) when as compared to control. The graded doses of the MEPM in normal saline showed a very significant increase in diuresis, natriuresis, kaliuresis, GFR (Table 1). 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 [HCO_3^-/Cl^-], [HCO_3^+/H^+] exchangers [9] and the antiporter, to cause diuresis. There was an increase in the ratio of concentration of excreted sodium and potassium ions after MEPM treatment. This indicates that the extract increases sodium excretion to larger extent than potassium, which is a very quality of diuretic with lesser hyperkalaemic effect. The *Physalis minima* extract exerted its diuretic activity possibly by inhibiting tubular reabsorption of water and accompanying anions, as such action has been hypothesized for some other plant species [10]. Therefore *Physalis minima* extract significantly increased the GFR due to a detergent like interaction with structural components of glomeruluar membranes and a decrease in renal perfusion pressure, attributable to decrease in the resistance of the afferent arteriole or an increase in the resistance of the efferent arteriole and/or the direct effect on the arteriole wall affecting glomerular blood flow [11]. As emphasized, diuretic properties of MEPM could be due to other active principles such as flavonoids, saponins and organic acids [12]. It is also possible that diuretic effect of the water MEPM could be due to other secondary active metabolites [13]. The other possibility for the observed diuretic effect of MEPM water could be due to indirect changes of some physiological parameters before blood filtration step [14] or the consequence of the observed glycosuria [15]. The observed decrease of urine osmolality could be explained by a marked increase in urinary flow, which seemed to be more important than the possible urinary electrolytes excretion. Administration of

the MEPM caused a diuretic response, which was accompanied with a slight increase in GFR. This finding suggests different mechanisms of action, like a direct effect on arterial pressure which could affect GFR or glomerular blood flow or by decreasing renal perfusion pressure [16]. MEPM caused diuresis by a mechanism quantitatively similar to that of furosemide and more than one mechanism seems to be involved. The MEPM did not affect plasma urea levels, urine pH, plasma osmolarity and hematocrite indicating that the rapid physiological regulation of these important parameters was not altered after RR infusion.

Table1. Effect of *Physalis minima* on urine volume and electrolyte concentration

Group	Treatment	Mean urine volume in ml	Electrolytes (m.eq/lt)		Na^+ / K^+ ratio
			Na^+	K^+	
1	Normal Saline (4ml/kg)	5.68±0.12	74.8±0.20	514.0±0.8	14.5
2	Furosemide (5mg/kg, p.o)	10.35±0.14**	178.64±0.28**	880.5 ±3.4**	20.3
3	MEPM (100mg/kg)	7.46±0.14**	86.23±0.16**	540.7±1.86**	15.9
4	MEPM (200mg/kg)	9.82±0.14**	108.18±0.23	635.2±1.4++	17.0

*Values expressed as Mean ± S.E.M. Values are considered extremely significant.*p<0.05, **p<0.01; when compared with the control group.*

CONCLUSION

In the present study *Physalis minima* possess significant diuretic activity. Diuretic activity of *Physalis minima* can be attributed to its molecular and cellular mechanism of methanolic extract of *Physalis minima* action of dieresis.

REFERENCES

[1]. Jyothibasu Tammu, K.Venkata Ramana. *Asian J Biochem Pharm Research*, **2011**, 3(1): 581-589,
[2]. Butler J, Forman DE, Abraham WT. *Am Heart J*. 147,**2004**, 331-338.
[3].Ellison DH. *Ann Intern Med*. 114, **1991**, 886-894.
[4]. Agharkar SP. Medicinal plants of Bombay presidency, PBI, Scientific Publishers, Jodhpur (India), **1991**, 230.
[5]. Harbone, JP, Phytochemical methods, a guide to modern technique of plant analysis (Chapmann and Hall, London), **1973**, 1-271.
[6]. Mukherjee PK, Das J, Saha K, Pal M, Saha BP. *Phytotherapy Research*. 10, **1996**, 424–425.
[7]. Abdala S., D. Martín-Herrera, D. Benjumea, P. Perez-Paz, **2008**, *J Ethnopharmacol*, 119, pp.12-16.
[8]. Murugesan T, Manikandan L, Suresh KB, Pal M, Saha BP. *Indian J. of Pharm. Sci*. 62(2), **2000**, 150.
[9]. Bevevino LH, Vieira FSA, Cassola AC, Sanioto SML. *Journal of Ethnopharmacology*. 43, **1994**, 197–201.
[10]. Bevenino LH, Mello Aires M. *Journal of Ethnopharmacology*. 43, **1994**, 203–207.
[11]. Abderahim A, Jaouad E, Zafar HI, Basiaa L. *J Ethanopharmacol*. 115, **2008**, 89-95.
[12]. Martín-Herrera D., S. Abdala, D. Benjumea, J. Gutierrez-Luis, **2008**, *J Ethnopha rmacol*, 117, pp. 496–499.
[13]. Tanira MOM, Ageel AM, Al-Said MS. *Fitoterapia*. LX 5, **1988**, 433–447.
[14]. Jouad H, Lacaille-Dubois MA, Eddouks M. *Journal of Ethnopharmacology*. 75, **2001**, 219–223.
[15]. Maghrani M, Lemhadri A, Jouad H, Eddouks M. Inhibition of renal glucose reabsorption accounts for the hypoglycaemic effect of *Retama raetam* in streptozotocin-induced diabetic rats, **2005**.
[16]. Sravani P, Mohana Lakshmi S, Saravana Kumar A. Evaluation of Diuretic Activity of Xanthium strumarium L.**2010**; 1(1): 31-34.