ISSN 0976 – 3333

Available Online at www.ijpba.info.

International Journal of Pharmaceutical & Biological Archives 2010; 1(4):331-334

ORIGINAL RESEARCH ARTICLE

Evaluation of Alcoholic and Aqueous Extracts of *Nicandra Physalodes* Leaves for Diuretic Activity

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Received 25 Aug 2010; Revised 15 Sep 2010; Accepted 01 Oct 2010

ABSTRACT

Aqueous and alcoholic extracts of *Nicandra physalodes* leaves were tested for Diuretic activity in rats. The parameters studied on individual rat were body weight before and after test period, total urine volume, urine concentration of Na+, K+ and Cl $^{-}$. In the present study alcoholic and aqueous extracts of *Nicandra physalodes* leaves (100mg/kg of body weight) showed increase in urine volume, cation and anion excretion. Furosemide was used as reference diuretic.

KEY WORDS

Nicandra physalodes leaves, Diuretic activity, Furosemide

INTRODUCTION

Diuretics are drugs that increase the rate of urine flow, sodium excretion and are used to adjust the volume and composition of body fluids in a variety of clinical situations. Drug-induced diuresis is beneficial in many life-threatening disease conditions such as congestive heart failure, nephritic syndrome, cirrhosis, renal failure, hypertension, and pregnancy toxaemia[1]. Most diuretic drugs have the adverse effect on quality of life including impotence, fatigue, and weakness. Naturally occurring diuretics include caffeine in coffee, tea, and cola, which inhibit Na^{+} reabsorption and alcohol in beer, wine and mixed drinks, which inhibit secretion of ADH[2,3]. Although most of the diuretics proved to be very effective in promoting sodium excretion **,** all cause potassium loss and prompted the search for potassium sparing diuretic. Hence search for a new diuretic agent that retains therapeutic efficacy and yet devoid of potassium loss is justified[4].

Nicandra physalodes (Solanaceae) commonly known as ran popati. It is a erect herb, with light blue or light purple flowers[5] .Decoction of leaves is used for killing head lice[6] . No systematic studies have been reported for its diuretic activity. Hence an effort has been made to establish the diuretic activity of aqueous and alcoholic extracts of *Nicandra physalodes*.

MATERIALS AND METHODS

Plant materials

The whole plant of *Nicandra physalodes* was collected in the month of June- July from Tirunelveli city. The plant was authenticated by Dr. Chelladurai Department of Botany, Palayamkottai , Siddha College, Tirunelveli.

Extraction

In the present study the whole plant were shade dried. 400gms of powdered drug was extracted with alcohol in soxhlet apparatus for 24hrs. A dark brown green coloured residue was obtained after concentrating the extract under reduced pressure. The aqueous extract was obtained by macerating 400gm of powered *Nicandra physalodes* with 3 liters of distilled water (72 hrs) The extract was filtered and concentrated under reduced pressure to obtain greenish brown colored residue.

Experimental animals

In bred colony strains of Wistar rats of either sex weighing 150-250 g procured from the animal house were used for the study. The animals were maintained in polypropylene cages of standard dimensions at a temperature of 28±1° C and

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standard 12 hour : 12 hour day / night rhythm. The animals were fed with standard rodent pellet diet (Hindustan Lever Ltd) and water *ad libitum*. Prior to the experiment the animals were acclimatized to the laboratory conditions.

Preliminary phyto chemical analysis

The preliminary phytochemical analysis[7,8] were carried out to find out the phytoconsituents present in the crude extracts.

Diuretic Activity

Male rats (wister albino strain) weighing 150 to 180gm were maintained under standard condition of temperature and humidity. The method of Lipschitz et al[9,10] was employed for the assessment of diuretic activity. The experimental protocols have been approved by the Institutional Animal Ethical Committee. Four groups of six rats in each and were fasted and deprived of water for eighteen hours prior to the experiment. The first group of animals serving as control, received normal saline(25ml/Kg,p.o.); the second group received furosemide (100mg/Kg,i.p.) in saline; the third, fourth, fifth and sixth groups received the Alcohol and Aqueous extract at the doses of 100 mg/Kg, respectively, in normal saline. Immediately after administration the animals were placed in metabolic cages (2 per cage), specially designed to separate urine and feaces , kept at room temperature of 25± 0.5ºC through out the experiment. The urine was collected in measuring cylinders up to 3 hrs after dosing. During this period, no food or water was made available to animals. The parameters taken for individual rat were body weight before and after test period, total concentration of Na^+, K^+, and Cl^- in the urine. Na^+, K^+ concentrations were measured by Flame photometry [11] and Cl^- concentration was estimated by titration [12] with silver nitrate solution(N/50)using three drop of 5% potassium chromate solution as indicator. Furosemide sodium salt was given by stomach tube. Optimal dose activity relation was found to be 20mg/Kg of furosemide per kg body weight in series of supportive experiments. Results are reported as mean ± SD, the test of significance ($p<0.01$ and $p<0.05$) was stastically.

Statistical analysis

All the results are expressed as mean ± standard error. The data was analyzed statistically using ANOVA followed by student't' test [13] at a probability level of $P < 0.001$.

RESULTS AND DISSCUSION

The preliminary phyto chemical analysis showed the presence of flavanoids, saponins, carbohydrates, terpenoids and alkaloids in all the extracts. The Aqueous and Alcohol extract 100mg/kg p.o. showed significant increase in excretion of sodium, potassium and chloride ions in the urine in a dose dependent manner. The obtained effect was comparable to that of furosemide (100mg/kg). The study supported the presence of effective diuretic constituents in the Aqueous and Alcohol extract of *Nicandra physalodes*. The results are shown in (**Table 1**). Diuretics relive pulmonary congestion and peripheral edema. These agents are useful in reducing the syndrome of volume overload, decreases cardiac workload, oxygen demand and plasma volume, thus decreasing blood pressure [14]. Thus, diuretics play an important role in hypertensive patients. In present study, we can demonstrate that ethanol, aqueous and chloroform extract may produce diuretic effect by increasing the excretion of Sodium, Potassium and Chloride. The control of plasma sodium is important in the regulation of blood volume and pressure; the control of plasma potassium is required to maintain proper function of cardiac and skeletal muscles [15]. The regulation of Sodium, Potassium balance is also intimately related to renal control of acid-base balance. The Potassium loss that occurs with many diuretics may lead to hypokalemia. For this reason, generally potassium-sparing diuretics are recommended [16]. In present study chloroform and alcohol extracts showed elevated levels of Potassium in urine, which may increase risk of hypokalemia and hence its potassium sparing capacity has to be investigated. Active principles such as flavanoids, saponins and terpenoids are known to be responsible for diuretic activity [17, 18, 19]. Results of present investigation showed that alcohol is most effective in increasing urinary electrolyte concentration of all the ions i.e Sodium, Potassium and Chloride followed by chloroform and aqueous extracts while other extracts did not show significant increase in urinary electrolyte concentration.

Diuretic activity of extracts of *Nicandra physalodes* leaves on rats

Treatment	Dose mg/kg	No of Rats used	Urine Volume (ml)	Na+ µ Moles/kg	K+ µ Moles/kg	Total Chloride µMoles/kg	Na+/K+ Ratio
Normal Saline	25ml/kg	6	2.0±0.10	1986±35	905±29	592±11	2.194
Aqueou extract	100mg/kg	6	2.9±0.13	2890±31	1320±410 *	2010±12	2.189
Alcoholic extract	100mg/kg	6	1.9±0.30	2090±40	1120±24	2210±80	1.866
Furosemide	100mg/kg	6	3.6±0.36	2998±44	1662±312	2690±11	1.550

The values are expression of the mean standard error. * $P < 0.001$ vs. control

REFERENCES

1. Agunu A., Abdurrahman EM., Andrew GO., Mohammed Z: Diuretic activity of the stem-bark extracts of Steganotaenia araliaceahoehst. *J Ethnopharmcol* ,2005;96:471-5.
2. Agus ZS., Goldberg M: Role of antidiuretic hormone in the abnormal water diuresis of anterior hypopituitarism in man. *J Clin Invest* ,1971;50:1478-89.
3. Stookey JD :The diuretic effects of alcohol and caffeine and total water intake misclassification. *Eur J Epidemiol* ,1999;15:181-8.
4. Rang HP, Dale MM., Ritter JM: In: Text book of Pharmacology. II edition. Churchill Livingstone, 1994;428-38.
5. Yoganarasimhan SN: Medicinal plants of India, Cyber media, Bangalore. India 2000: 377.
6. The Wealth of India, Council of Scientific and Industrial Research [CSIR] Publications, New Delhi, 1991:19.
7. Kokate CK, Purohirt AR, Gokhale CB, Pharmacognosy. 27 th ed. Nirali Prakashan, 2004:344.
8. Finar IL., Organic chemistry-stereochemistry and the chemistry of natural products. V edition, Singapore: Pearson Education Ltd, 1975,518.
9. Lipschitz W L, Haddian Z and Kerpscar A , Bioassay of Diuretics, *J.Pharmacol.Exp.Ther,* 79;97-110:1943.
10. Murugesan T, Manikandan L , Suresh KB, Pal M and. Saha BP: Evaluation of diuretic potential of *Jussiaea suffruticosa* Linn.extract in rat, *Indian J.Pharm.Sci.* 2000;62(2):150-151.
11. Jeffery GH., Bassett J, Mendham J and Denny RC :Vogel's Textbook of Quantitative Chemical Analysis,V th edition. Addison Westley Longman Ltd., England 1989,801.
12. Beckette AH. And Stenlake JB., *Practical* Pharmaceutical Chemistry, Part I, 1st edition, CBS Publishers and Distributors, New Delhi 1997,197.
13. Amritage P .,Eds., In; Stastical Methods in Medical Research, Blackwell Scientific Publications, London, 1971,217 .
14. Hoeland D and Mycek MJ, Lippincott's illustrated Reviews: Pharmacology, Lippincott Willams and Wilkins, Philadelphia, 2000 ;157-58:240-241.
15. Guyton AC and Hall JE ., The body fluid compartments: extracellular and intracellular fluids; interstitial fluid and edema. In: Textbook of medical physiology, IX edition. Singapore, PA: W.B. Saunders Company ,1998 ,306-308.
16. Sturat IF., Human Physiology, Wm. C. Brown publishers, Dubuque, lowa 2 nd Edition, 2002;500-503, 508.
17. Chodera A , Dabrowska K ,.Sloderbach A, Skrzypczak L and Budzianowski J, Effect of flavonoid fractions of *Solidago virgaurea* Lon diuresis and levels of Electrolytes, *Acta pol pharm*, 1991;48:35-37.

***Corresponding Author:** Devi P, **Email:** meeraharsa@yahoo.com

18. Sood AR., Bajpai A. And Digits M, Pharmacological and biological studies on Saponins, *Indian. J. Pharmacol*.1985; 17 (3): 178-179.

19. Rizvi SH, Shoeb A, Kapil RS and Satya P.Popli, Two diuretic triterpenoids from Antiderma menasu, *Phytochemistry*. 1980; 19(11): 2409-2410.