



## Diuretic efficacy of *Cynodon dactylon* on guinea pigs with comparison of medium efficacy

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**Received for publication:** November 27, 2012; **Accepted:** January 20, 2013.

**Abstract:** The present study was aimed to evaluate the anti-diuretic properties of *Cynodon dactylon*. Guinea Pigs were divided in four group of 6 each (Group-I-Control, Group-II standard, Group-III and Group-IV low and high dose test). Control group received 0.9% normal saline (25ml/kg), Standard (Hydrochlorothiazide 2.5ml/kg), Test (*Cynodon dactylon* 1.25ml and 2.5ml/kg). All the drugs were administered and diuretic activity was evaluated. After 5h of drug administration urine volume, sodium, potassium and chloride were estimated. 2.5ml/kg plant administered groups showed high urine output, sodium, potassium and chloride extraction compared to other groups. From the study observations *Cynodon dactylon* have diuretic activity. Further studies required to find the mechanism action of plant extract.

**Key words:** Crude extract; *Cynodon dactylon*; Diuretic; Metabolic Cage; Sodium; Potassium; Urine output

### INTRODUCTION

Research on medicinal plants required to synthesis new drugs in the treatment of various diseases. *Cynodon dactylon* is Poaceae family. It is one of the widely-used plant in this family in ayurveda [1]. This plant contains various chemical constituents like steroids, carbohydrates, oxides, salts, carotene, alkaloids, vitamins and acids [2,3,4,5]. According to previous studies this plant can use internal as well as external in various diseases. It can be used for wound healing, septic, skin allergy, diarrhoea, epilepsy, hypertension, piles, diuretic, menstrual disorders, renal stones, antioxidant, stimulate spermatogenesis, increase libido, anabolic and neuroprotective [6,7,8,9]. Some of the studies proved this plant extract have antimicrobial activity and can used in urinary tract infection, syphilis, amebiasis [10,11]. *Cynodon dactylon* was used as a analgesic in toothache and other dental diseases [12]. Synthetic diuretic agents inhibit the ion transporters in nephrons and increase the urinary water, electrolyte excretion. Based on the efficacy the diuretic is classified in to high, medium and low ceiling agents. There are no studies on the diuretic activity of the plant on guinea pigs. Thus, this study was taken up. The present study was there for aimed and explore diuretic activity of *Cynodon dactylon* on guinea pigs. The efficacy was compared with standard diuretic agent.

### MATERIALS AND METHODS

#### Chemicals:

Hydrochlorothiazide (Arubindo Pharma Ltd., Hyderabad), Sodium, Potassium and Chloride Kit (Crest Biosystems, Goa, India).

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#### Collection of plant material:

The *Cynodon dactylon* was purchased from Aswathy Herbal Store, Tarnaka, Hyderabad. It was identified and authenticated by Dr. Prabhakar, Professor and Head, Department of Botany, Osmania University, Hyderabad.

#### Preparation of crude extract of *Cynodon doctylon*:

The plant material was extracted by standard procedure. Shared dried plant material was powdered by using normal grinder. 100g of plant powder was mixed with 1000ml of water. The mixer was boiled for 30min and filtered by using Watmen filter paper and collected [13]. The extract was evaporated at 60°C on water bath and yield was stored in desiccator.

#### Animals:

Guinea Pigs 400-500g of either sex was included in the study. All the animals were kept in cages at standard temperature with 12h:12h light and dark cycle. Animals were allowed free access to water and food. Food was withdrawn from Guinea-pigs 24h prior to experiment [14].

#### Experimental design:

The animals were divided in to four groups.

- Group-I: Control (0.9% of normal Saline)
- Group-II: Hydrochlorothiazide (2.5mg/kg/orally)[15]
- Group-III: Crude extract of *Cynodon dactylon* (1.25ml/kg/orally)
- Group-IV: Crude extract of *Cynodon dactylon* (2.5ml/kg/orally) [16]



**Ethical Clearance:**

All the animals were kept in Institutional Animal House. The study was approved by the Institutional Animal Ethics Committee of Gandhi Medical College.

**Procedure:**

The animals were treated with respective drugs. After administration of drugs each animals was kept in metabolic cages and food and water not given during the experiment time. Conical flask was kept to collect the urine a period of 5h. Final urine volume was expressed in ml/kg[17].

**Estimation of electrolytes:**

The collected urine was subjected for estimation of sodium, potassium and chloride [18,19]. Electrolytes were quantified by flame photometer and Spectrophotometer (BHI-LSR-438, Bellstone Hi Tech International, Delhi, India). All electrolyte estimation kits were purchased from (Crest Biosystems, Goa, India).

**Statistical analysis:**

One way ANOVA was used for the analysis of data. For the multiple comparison PostHoc followed by Dunnet't test was used. The groups showed P<0.05 considered statistical significance [20].

**RESULTS**

Table.1 explains the efficacy of plant on urinary excretion. The standard and plant administer groups showed significant increase in urine output compared to control group. Effect of plant on urine output has significant difference compared with standard drug. 1.25ml/kg of plant treated group showed results same like standard drug. There was significant difference were observed in urinary electrolyte excretion compared standard with test groups. High dose plant extract treated [Urine output (14.04ml/kg), Sodium (84.15Meq/kg), Potassium (93.84Meq/kg), Chloride (154.33Meq/kg)] group showed better results than standard [Urine output (9.28ml/kg), Sodium (61.18Meq/kg), Potassium (81.36Meq/kg), Chloride (122.87Meq/kg)] drug in urine output and electrolyte excretion (Table.2).

**Table.1:** Effect of *Cynodon dactylon* on urinary output in Guinea Pigs

Groups	Drug/ Dose administration	Urine volume (ml/kg) (MEAN±SEM)
Group-I	Normal Saline	5.58±0.58
Group-II	Hydrocholorthiazide (2.5ml/kg)	9.28±0.35*
Group-III-	<i>Cynodon dactylon</i> crude extract (1.25ml/kg)	11.75±0.98*.,#,+†
Group-IV-	<i>Cynodon dactylon</i> crude extract (2.5ml/kg)	14.04±0.73*.,#,+†

(\*P<0.05 significant compared Group-I with others, #P<0.05 significant compared Group-II with others, †P<0.05 significant compared Group-III with others)

**Table.2:** Effect of *Cynodon dactylon* on urinary electrolyte extraction

Groups	Urinary Sodium extraction (Meq/kg) (MEAN±SEM)	Urinary Potassium extraction (Meq/kg) (MEAN±SEM)	Urinary Chloride Extraction (Meq/kg) (MEAN±SEM)
Group-I	43.67±1.37	54.83±2.78	54.83±6.45
Group-II	61.18±2.96*	81.36±3.85*	122.87±2.56*
Group-III	72.56±3.67*.,#	89.23±2.95*.,#	134.56±4.29*.,#
Group-IV	84.15±2.89*.,#,+†	93.84±1.56*.,#,+†	154.33±4.66*.,#,+†

(\*P<0.05 significant compared Group-I with others, #P<0.05 significant compared Group-II with others, †P<0.05 significant compared Group-III with others)

**DISCUSSION**

Diuretics are the agents used to reduce the syndrome of fluid overload. These are agents used to treat hypertension, edema, pulmonary and cerebral edema. The diuretics acts on different parts of nephrons leads to increase the excretion of fluid and electrolytes from the body. This property used to treat hypertension and other diseases because of increase fluid volume in the body. Uses of these agents caused development different adverse effects. To overcome this use of medicinal plants are best option. *Cynodon dactylon* is a one of the medicinal plant has diuretic activity. The present study was conducted to evaluate the diuretic activity of plant in guinea pigs. According to observed results administration of crude extract increase the urine output compared to control group. Administration of plant extract increased sodium, potassium and chloride excretion in the urine. High dose plant treated groups showed highly significant results compared with standard and control groups. Previous studies found *Cynodon dactylon* contains alkaloids, tannin, quinines, phenols, tyrtamine, tyramine, gramine, cynodin, hydrocyanic acid, triticin, beta carotene, arundoin, furfural, furfiralcohol, beta-ionone-2- (4 hydroxyphenyl) -propionic, 4-hydroxybenzoic, 2- (3-methoxy-4-hydroxyphenyl) propionic, 3- methoxy-4-hydroxybenzoic acids. These chemicals may be responsible for the diuretic activity in guinea pigs. From these studies proved that administration of high dose plant extract increased the urine output, sodium, potassium and chloride excretion. But there is a required further study to standardize more effective dose of plant extract and also required molecular studies to find the mechanism of action of plant extract.

**CONCLUSION**

Administration of *Cynodon dactylon* crude extract showed significant diuretic activity. The efficacy of plant extract is relative same of thiazide diuretics. The more number of multi center preclinical studies and clinical studies required to standardize the effective dose plant extract.

## REFERENCES

1. Sindhu G, Ratheesh M, Shyni GL, Helen A, Inhibitory effects of *Cynodon dactylon* L. On inflammation and oxidative stress in adjuvant treated rats, *Immunopharmacol Immunotoxicol*, 2009, 31, 4, 647-53.
2. Artizzu N, Bongsignore L, Cottiglia F, Loy G, Studies on the diuretic and antimicrobial activity of *Cynodon dactylon* essential oil, *Fitotrapia*, 1996, 67, 174-176.
3. Jaralad EE, Joshi SB, Jain DC, Antidiabetic activity of aqueous extract and non-polysaccharide fraction of *Cynodon dactylon* Pers, *Ind.J.Exp.Bio* , 2008, 46, 660-667.
4. Babu DSR, Neeharika V, Pallavo V, Reddy MB Antidiarrheal activity of *Cynodon doctylon* Pers, *Pharmacog Magazine*, 2009,5,23-27.
5. Patil MB, Jalapure SS, Prakash NS, Kokate CK Antiulcer properties of alcoholic extract of *Cynodon doctylon* in rats, *Acta Horti*, 2005,480,115-118.
6. Singh SK, Kesari AN, Gupta RK, Jaiswal D, Watal G Assessment of antidiabetic potential of *Cynodon dactylon* extract in streptozotocin diabetic rats *J. Ethnopharmacol*, 2007, 114, 174-179.
7. Santhi R, Annapoorani S Efficacy of *Cynodon dactylon* for immune modulatory activity, *Drug Invention Today*, 2010,2,112-114.
8. Chidrawar VR, Chitme HR, Patel KN, Racharla VR, Dhoraji NC, Vadalía KR Effects of *Cynodon dactylon* on stress induced infertility in Male rats *J Young Pharm* 2011,3,1,26-35.
9. Kumar RB, Patel M, Bansal R, Singh L Evaluation of antiepileptic activity of leaf extract of *Cynodon dactylon* in validated animal models, *Int J Pharm Res*, 2010,1, 2,1-6.
10. Parekh J, Chanda SV *In vitro* antimicrobial activity and Phytochemical analysis of some Indian medicinal plants, *Turk J Biol*, 2007,31,53-58.
11. Santosh KS, Prashant KR, Dolly J, Geeta W Evidence-based critical evaluation of Glycemic potential of *Cynodon dactylon* Evidence Based Complement, *Alternat Med*, 2008,5,4,415-420.
12. Vipin Kumar G, Khosa RL Analgesic and anti-pyretic activity of aqueous extract of *Cynodon dactylon*. *Pharmacologyonline*, 2008, 3, 12-18.
13. Alai VR, Vadnere GP, Patil MV, Singhai AK Gaud RS The antianaphylactic effects of *Solanum anthocarpum* flowers. *Indian J Pharmacol*, 2008;40,2, 66-90.
14. Munner AA, Salman W, Husni A *Tribulus terrestris*: preliminary atusy of its diuretic and contractile effects and comparison with *Zea mays*. *J Ethnopharmacol*, 2003, 85, 2-3,257-260.
15. Noordewier B, Bailie MD Hood JB Pharmacological analysis of the action of diuretics in the newborn pig. *J Pharmacol Exp Ther*, 1978,207,1,236-42.
16. Poonguzhali KP, Hariprases C, Chandrashekharan AN, Gowri C, Ganesan N Effect of *Cynodon dactylon* and *tenoxicam* on the lysosomal enzyme activities in the cartilage tissue of osteoarthritic guinea pigs, *Journal of clinical biochemistry and nutrition*, 1998,24,3,141-149.
17. Galati EM, Tripodo MM, Trovato A, Miceli N, Monforte MT Biological effect of *Opuntia ficus indica* (L.) Mill. (Cacraceae) waste matter Note I: diuretic activity, *Journal of Ethanopharmacology*, 2002,79,17-21.
18. Sur TK, Pandit S, Biswas TK, Ghosh RB Bhattacharyya D Diuretic activity of *Coleus aromaticus* benth on rats, *Ancient Science of Life*, 2003, 22,4,1-5.
19. Wiebelhaus VD, Weinstock J, Maass AB, Brennan FT, Sosnowski G The diuretic and natruretic activity of Triamterene and several related pteridine in the rats, *J Pharmacol Exp Ther*, 1965,149,397-403.
20. Murugesan T, Manikandan L, Suresh KP, Pal M, Saha BP Evaluation of diuretic potential of *Jussiaea suffruticosa* Linn. In rats *Indian J Pharm*, 2000, 62, 21, 50-151.

Source of support: Nil

Conflict of interest: None Declared