

EVALUATION OF DIURETIC ACTIVITY OF AQUEOUS AND ALCOHOLIC RHIZOMES EXTRACTS OF *COSTUS SPECIOSUS* LINN IN WISTER ALBINO RATS

Dubey Subodh*¹, Verma Vijendra K.², Sahu Amit K.², Jain Amit K¹, Tiwari Akash³

¹IPS College of Pharmacy, Gwalior, M.P., India

²KLES College of Pharmacy, Belgaum, Karnataka, India

³Cipla Ltd. Indore, M.P., India

Received: 08-10-2010; Revised: 13-11-2010; Accepted: 25-11-2010

ABSTRACT

The present study was carried with the rhizomes of *Costus Speciosus* Linn, belonging to family Zingiberaceae. It is an erect perennial herb and has recently gained importance as a commercial source of diosgenin and commonly known as “Push Kara“, “Kashmeera”, “Keu” and Kust. In Pharmacological screening the effect of aqueous and alcoholic extracts of rhizomes of *Costus Speciosus* Linn was evaluated in Albino rats of either sex (150-200g) for diuretic activity at a dose of 250mg/kg. b.w. the effect was compared with furesemide (100mg/kg. b.w.) as standard drug in diuretic activity. Both extracts significantly increased the urine output as well as urinary electrolyte concentration. Pet. Ether was found to be least potent. Thus from study and literature, It can concluded that *Costus Speciosus* Linn have potent diuretic activity.

KEYWORDS: Diuretic activity, *Costus Speciosus*, Pharmacological screening, Furesemide.

*Address for correspondence

Subodh Dubey

Asst Prof

Dept of Pharmacognosy

IPS College of Pharmacy, Gwalior, M.P., India

e-mail: subodh_dubey39@yahoo.com

INTRODUCTION

Drug inducing states of increased urine flow are called as diuretics¹. These agents are ion transport inhibitors that decrease the reabsorption of Na at different site of the nephron, as result Na and other ion such as Cl enter the urine in greater amount than normal along with water. Diuretic are used to adjust the volume and composition of body fluid in variety of disorder including hypertention, nephritic syndrome, cirrhosis, renal failure, heart failure and pregnancy toxemia². Most diuretic drugs have the adverse side effect such as hypokalemia, dehydration, hyperuricemia, hypertriglyceridemia, gastric problems including peptic ulcer. Naturally occurring includes caffeine in coffees, tea and coca sodas, which inhibit Na reabsorption and alcohol in beer, wine and mixed drinks, which inhibit secretion of antidiuretic hormone. 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.³

Costus Speciosus (Zingiberaceae) is an enert perennial herb, rhizomes 120-300 cm hight, with a thick creeping rhizomes and to be used in traditional medicine. The rhizomes are used in skin disease, fever, asthma, bronchitis astringent, diuretic, purgative and aphrodisiac properties.⁴ The ethanolic extract of rhizomes possesses anti-inflammatory and anti-pyretic activities, and hepatoprotective activity also possesses^{5,6}. Methanolic extract of rhizomes possess antioxidant and antimicrobial activity^{7,8}. Other activity also possess to rhizomes as diabetes, anti noniceptive activity, hyperlipidemic, arthritics and estrogenic activity^{9,10,11,12}. Phytochemical literature reveals the presence of saponin like as diosgenin, sapogenin, tigogenin, steroids, alkaloids^{13,14}.

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 rhizomes of *Costus Speciosus* Linn.

MATERIAL AND METHODS

Plant collection

Fresh rhizomes of *Costus Speciosus* were collected in the month of August from the district of Gwalior in Madhya Pradesh. It was identified and authenticated. The voucher specimens were deposited at the College for future Reference.

Preparation of Extracts

Preparation of alcoholic extracts

About 200 gm of dried powder was extracted with about 800 ml of 70% v/v alcohol in a Soxhlet extractor. The extraction was continued until the solvent in the thimble become clear. After complete extraction, the extract was filtered and solvent was distilled off in a rotary flash evaporater at 40°C. The extract was concentrated to dry residue in a desicator over anhydrous Sodium Sulphate. The resulting extract were weighed and filled into sample containers. The percentage yield for the rhizomes extract of *Costus Speciosus* were 30.54 gm carried out.

Preparation of aqueous extract

About 200gm of dried powder was subjected to cold maceration with chloroform water I.P. in a conical flask for about 7 days at room temperature. The flask was securely plugged with absorbent cotton and shaken periodically. Then the material was filtered through a muslin cloth and mark was pressed. The filtered was refiltered through whatman filter paper to get the clear filtrate. The filtrate was concentrated to dry residue in a desicator over anhydrous Sodium Sulphate. The resulting extract were weighed and filled into sample containers. The percentage yield for the rhizomes extract of *Costus Speciosus* were 59.34 gm carried out.

Experimental animals

Healthy adult male rats weighing between 150-200 gm will be selected for diuretic activity.

Drug

Furosemide (100 mg /kg b.w.) a reference diuretic

Diuretic Activity

Animals were divided in five groups containing six in each all animal work being provided food and water 18 hours were scheduled as follows¹⁵.

Group I - receive normal saline (25ml/ μ g) and drinking water and libitum.

Group II - receive furosemide (100mg/kg b.w. I.P.) a reference diuretic.¹⁶

Group III & IV - receive alcoholic extract at the dose level of 250 and 500 mg/kg b.w. I.P.) respectively.

Group V & VI – received aqueous extract at the dose level of 250 and 500 mg/kg b.w.) respectively.

Immediately after closing animals were placed into individual metabolic cages. Specially designed to Separate faces and allow collection of urine in to volumetric flask, through funnel at the lower portion of the cages. After a period of 5 hours the urine collected in each of collecting flask was measured using a graduated measuring cylinder and the volume of urine corresponding to each of the group was noted. The volume of urine was measured for both control and treated groups. The parameter taken for each individual were total urine, urine concentration of Na⁺, K⁺ and Cl⁻ were measured by flame photometry. The urine concentration of the electrolytes is expressed in terms of Meg/L and the urine volume is expressed in ml/kg body weight.

Statistical analysis

All the results are expressed as mean \pm standard error. The data was analyzed statistically using ANOVA followed by student T Test.¹⁷

RESULTS

Present study shows that the aqueous and alcoholic extracts of *Costus Speciosus* rhizomes possess good diuretic activity. Urine volume, cation and anion extraction were increased, significantly increase in Na⁺, K⁺, and Cl⁻ ion excretion was observed in aqueous and alcoholic extracts treated animal at dose tested (250 mg/kg b.w. oral) but it was less than furosemide control as well as aqueous extract much potent than alcoholic extract. Further studies are required to assess the medicinal value of rhizome of *Costus Speciosus* as a potential diuretic agent (**Table 1**).

DISCUSSION

Diuretics relieve pulmonary congestion and peripheral edema. These agents are useful in reducing the syndrome of volume overload, including orthopnea and paroxysmal nocturnal dyspnoea. They increase plasma volume and subsequently venous return to the heart. This decreases cardiac work load, oxygen demand and plasma volume, thus decreasing blood pressure. Thus diuretics play an important role in hypertensive patients.¹⁸

In the present study indicates pharmacology evaluation of diuretic action of aqueous and alcoholic extracts of rhizomes of *Costus speciosus* Linn were screened for diuretic activity and in each case the dose of the extract administrated was 400mg/kg body weight, per oral. The diuretic study was carried out as per the modified of Lipschiz.et.al.

Urine volume, concentration of electrolytes in the urine such as sodium, chloride, and potassium were the parameters measured while assensing the diuretic potential of both extract.

The urine volume is expressed in ml and the concentration of electrolyte was expressed in mEq/L. all the values are expressed as mean \pm SEM. The values obtained for the parameters in case of the extract were compared with that of standard drug treated (furosemide) and control group by using ANOVA test followed by Dennetts test. The comparison made for the urine volume, concentration of electrolytes. P<0.05 is considered as moderately significant, p<0.01 is considered as highly significant.

The present study revealed that alcoholic and aqueous extracts of *Costus peciosus* Linn significantly increased the urinary output as well as urinary electrolyte concentration at dose tested (400mg/kg b.w.oral.) the aqueous extract potentiated the activity. Whereas alcoholic extract was found to be least potent.

Previous studies have demonstrated also that are several compound which could be responsible for the plant diuretic effect such as flavonoids, saponins (sapogenin,diosgenin).

These results tends to suggest that the alcoholic and aqueous extract of rhizomes of *Costosus Speciosus* Linn possess diuretic activity and it is traditional use as diuretic justified.

REFERENCES

- 1- Harry AR, Mary JM, Champe PC. Text book of pharmacology. 2nd Edn. Lippincotts Illustrated Review UK :1997;223.
- 2- Agunu A, Abdurahman EM, Andrew GO, Muhammed Z. Diuretic activity of the stem-bark extracts of *Steganotaenia araliaceahoechst*. J Ethnopharmacol 2005;96:471-5.
- 3- Meera Ret *al*. Evaluation of Diuretic activity from *Tylophora indica* leaves extracts J. Pharm. Sci. & Res 2009;1(3): 112-116.
- 4- Kirtikar KR, Basu BD, Indian Medicinal Plant. Second Edition, Vol.4, Allahabad, Lalit Mohan Basu M.B. 1976, 2442 pp ,23A.
- 5- Danish T *et al* Anti-inflammatory and antipyretic properties of the rhizome of *Costus Speciosus* (koen.) sm. Journal of Basic and Clinical Pharmacy 2010; 15:8
- 6- Evaluation of protective effect of ethanolic extret of costus speciosus rhizomes on carbon tetra chloride induced hepatotoxicity in rats. Natural product of radiance 2009; 8(2):123-26.
- 7- I-Nan *et al* Chen Antioxidant and Antimicrobial Activity of Zingiberaceae Plants in Taiwan Plant Foods for Human Nutrition (Formerly Qualitas Plantarum) 63(1):15-20
- 8- Vijayalakshmi MA. Screening of Costus speciosus extracts for antioxidant activity Fitoterapia 2008; 79 :197–198.
- 9- Eliza J, Daisya P, Ignacimuthub S. Duraipandiyamb. Antidiabetic and antilipidemic effect of eremanthin from *Costus speciosus* (Koen.)Sm., in STZ-induced diabetic rats. Chemico-Biological Interactions 2009; 182 :67–72.
- 10- Dasgupta B, Pandey VB, A new indian source of diosgenin (*Costus speciosus*) Cellular and Molecular Life Sciences 26(5):475-476.
- 11- Sanjiv B *et al*. Assessment of anti nooceptive efficacy of Costus Speciosus rhizomes in swish albino rats
- 12- Khare CP. Indian medicinal plants: anillustrated dictionary. Springer: Berlin, Heidelberg, 2007
- 13- Pratap Singh *et al* Pharmacognostic Study of *Costus speciosus*. Pharmaceutical biology 1981; 19(2-3):103-111.
- 14- Chen Changxiang, Yin Huixin. Steroidal saponin from Costosus speciosus natural product and research and development 1995
- 15- Kulkarni SK. Hand book of Experimental Pharmacology. 2nd Edition. Vallabh Prakashan, New Delhi. 1993;82-7.
- 16- Vaggelis Hondrellis *et al* Metal complexes of the diuretic drug furosemide. 119(10):1091-1101.
- 17- Lipschitz WL, Hadidam Z. Bioassay of diuretics. Journal of Pharmacology Experiment Therapeutics. 1945;79(2): 97-110.
- 18- Mohammad Farid Akhtar: Chemical and Biological Investigations of Medicinal Herbs: *Phyla nodiflora, Ruellia patula and Ruelliabrittianiana*. Ph.D. Thesis. Pakistan: University of Karachi; 1993.

Table 1

Parameters	Dose	Control	Standard	Aqueous	Alcohol
Urine volume	400 mg/kg b.w.	1.800±06	8.325±0.10**	4.532±0.13**	3.415±0.12**
Na ⁺	400 mg/kg b.w.	10.25±0.10	19.31±0.31***	15.93±0.11***	10.14±0.27*
K ⁺	400mg/kg b.w.	70.00±0.66	90.00±0.50**	70.22±0.70**	65.09±0.69**
Cl ⁻	400mg/kg b.w.	8.70±9.235	15.7±15.17**	13.6±13.88**	11.7±12.33**

Each value represents the mean ± SEM of six rats.

P< 0.05*, P<0.01**, P<0.001***

Source of support: Nil, Conflict of interest: None Declared