Ancient Science of Life Vol. No XX (1&2) July, August, September, October 2000 pages 44 - 47

Antiurolithiatic activity of coleus Aromaticus Benth. In Rats

R.B. GHOSH[1], T.K. SUR[2], L.N. MAITY[1], S.C.CHAKRABORTY[3]
[1]Department of Kayachikitsa, Institute of PG Ayurvedic Education & Research, Calcutta-9
[2]Department of Pharmacology, University College of Medicine, Calcutta-20
[3]Department of Urology, IPGMER, Calcutta-20

Received: 31.3.2000 **Accepted: 12.5.2000**

ABSTRACT : *Water extract of the leaves of coleus aromaticus Benth. Was tested for its antiurolithiatic activity against calcium oxalate stones in male albino rats. Calcium oxalate stones were induced by feeding 3% w/w sodium oxalate along with normal feed. The water extract of coleus aromaticus (0.5 g/kg and 1.0 g/kg, once, orally for 30 days) was found to be effective in reducing deposition of calcium oxalate. Hence, it is suggested, coleus aromaticus leaves may be effective in the therapy of calcium oxalate stone formation in kidney and urinary tract.*

INTRODUCTION

Urinary stone disease is a common disorder estimated to occur in approximately 12% of the population, with a recurrence rate of 70-80 % in males, 47-60% in females[1]. Urinary stones are made up of calcium oxalate, magnesium ammonium phosphate, calcium phosphate, uric acid and cystine. In most cases the common component is either calcium oxalate or magnesium ammonium phosphate[2].

In the Indian indigenous system of medicine, the leaves of *Coleus aromaticus* Benth. are reported to be useful in the treatment of urinary stones. It is also used in dyspepsia, liver disease and chronic cough[3-5]. although the plant is claimed to be useful in t treatment of urinary stone, there is scarce information of systematic pharmacological studies of the plant. The present stud was planned to assess the efficacy of the water extract of *Coleus aromaticus* leaves as antiurolithiatic in albino rats.

MATERIALS AND METHODS

(i) **Plant Extract:** The Plant material was identified botanically by botanical survey of India, Govt, of India, Calcutta. The leaves were washed and shade-dried. The dried leaves made into a fine powder. Freshly prepared aqueous suspension of it was used through out the experiment.

(ii) **Animal:** Adult male Wistar rats weighing between 150 ± 5g were used in the study. The animals were grouped in polypropylene cages at an ambient temperature of 22 ± 1°C with 12 h light and dark cycle. The animals were maintained wit commercial rats fed and water *ad libitum*. They were further segregated into groups of 10 for different experimental schedule.

(iii) **Experimental Procedure:** Animals were divided into 4 groups each comprising 10 animals. Placing the rats in individual metabolic cages collected the 24 h urine samples. The urine samples were quantitatively analyzed for calcium, phosphate and oxalate. Urolithiasis was induced by calculi producing diet (CPD) - commercial rat feed mixed with 3% w/w sodium oxalate[6-7]. The animals were put on the following treatment schedule: Group I animals were maintained on the normal diet; Group II animals were given CPD for 30 days; Group III animals were given CPD and water extract of *C. aromaticus* (1.0g/kg/day, orally) for 30 days.

One day before sacrifice, 24 h urine samples were collected and calcium[8], posphate[8] and oxalate[10] were determined. After the experimental period the animals were sacrificed. Kidneys were carefully removed, washed in ice cold 0.15 M KCI and their weights were recorded. Kidneys of each animal was homogenized in 10% HCL. The homogenate was centrifuged at 3000 r.p.m. for 10 min and the supernatant was used for the estimation of calcium[8] and oxalate[10].

(iv) **Statistical analysis:** Unpaired Student's t-test was applied for statistical evaluation of the data. P value less than 0.05 considered as significant.

RESULTS AND DISCUSSION

In the present study male rats were selected to induce urolithiasis because the urinary system, of male rats resembles that of human[11]. The results obtained in this stud indicate that the model selected for inducing urolithiasis, ie., 3% w/w sodium oxalate is suitable and reproducible (Table 1). Urinary stone formation takes place due to a change in urinary chemistry such as hypercalciuria and hyperoxaluria, leading to urinary super-saturation which later crystallizes, aggregates and ends up in stone formation[12-13]. In the present stud, an increase in deposition of calcium (43%) and oxalate (112%) in the kidney were observed in CPD –fed rats when compared to the normal (Table1) Te increase in calcium deposition in the kidney and its urinary excretion ma be due to a defective r4nal tubular reabsorption[13-14].

Administration of *C. aromaticus* water extract, both higher and lower doses, statistically reduced calcium (23% and 9% respectively) and oxalate (24% and 28% respectively) deposition in the kidney in CPD – fed rats (Table 1). The kidney ATP –n ases and phosphohydrolases are responsible in the process of calcification. The modulator role of C. Aromaticus on ATP ases and phosphohydrolases as been observed in earlier studies15. the plant extract attenuated the urinary excretion of calcium and oxalate without affecting the phosphate concentration in CPD- fed rats (Table 2) This may be due to inhibition in intestinal absorption of calcium and oxalate.

In conclusion, the presented data indicate that administration of the water extract of *C. aromaticus* leaves to rats wit CPD-fed urolitiasis reduced the deposition of calcium oxalate or growth of kidney stone, supporting information

of ayurveda regarding antiurolithiatic activity of the plant.

Table 1. *Coleus aromaticus* leaves on calcium and oxalate deposition in the kidney in CPD-treated rats

Group	Treatment	Deposition in the kidney (mg/g wet tissue)	
		Calcium	Oxalate
I	Normal control	2.68 ± 0.02	0.43 ± 0.06
II	CPD – treated	3.83 ± 0.05a**	0.91 ± 0.03a**
III	CPD – treated + C. aromaticus (0.5g/kg/day, orally, 30 days)	2.93± 0.08b**	0.69 ± 0.07b*
IV	CPD – treated + C. aromaticus (1g/kg/day, orally, 30 days)	2.73 ± 004b**	0.65 ± 005b**

N=10 in each group; Values are Mean ± SEM; a= compared Group I; b= compared with group II ; * indicate p< 0.01 and ** indicate p<0.001

Table 2 Antiurolithiatic activity of *Coleus aromaticus* leaves on urinary electrolyte concentration in rats

Group	Treatment	Calcium	Oxalate	Phosphate (mg/dL)
I	Normal control	2.03 ± 0.04	2.28± 0.02	98.5 ± 0.41
II	CPD – treated	2.95 ± 0.02a**	3.76 ± 0.06a**	103.1 ± 0.57ans
III	CPD – treated + C. aromaticus (0.5g/kg/day, orally, 30 days)	2.75 ± 0.05b*	3.52 ± 0.03b*	94.4 ± 0.34 bns
IV	CPD – treated + C. aromaticus (1g/kg/day, orally, 30 days)	2.64 ± 0.02b**	3.32 ± 0.05b**	88.3 ± 0.63 bns

N=10 in each group; Values are Mean ± SEM; a= compared Group I; b= compared with group II ; * indicate p< 0.01 and ** indicate p<0.001 and ns indicate statistically not significant.

REFERENCES:

1. Smith, C.L. and Guay, D.R.P. “Pharmacotherapy and pathophysiologic approach” Elsevier New York, second Edn (1992).

2. Roth, R.AND Finlayson, B. “Stones Clinical Management of Urolithiasis”, Williams and wilkins, London, Libertino JA Edn., (1983)

3. Copra, R.N. “Indigenous Drugs of India”, Academic Publisher, Calcutta, second Edn., (1987).

4. Sharma P.V. “Dravyaguna Vigyan”, Chaukhambha samskrit sansthan, Varanasi sixth Edn., Vol II, (1982).

5. Nadkarni, K.M. “Indian Materia Medica”, Popular Prakashan, Bombay, Vol I (1993)

6. Chow, F.H.C., Hamer, D.W. and Udall R.H. Prevention of oxalate and phosphate lithiasis by alanine, Invest Urol., 1,50-53 (1974)

7. Ahmed a., Pendse, A.K. Sarana, S.S, and sing, P.P. Effectiveness f a unani therapy (Sanges armahi) in management of urinary stone disease Ind. J. Exp. Biol., 31,20-264,(1993).

8. Lorentz, K. Improved determination of serum calcium with ortho-cresolphthalein complexone, Clin. Chem Acta., 16,327-333,(1982).

9. Alan, H.G., Janet R.M. and Donald M.H. “Varley’s Practical clinical chemistry”, William Heinimann Medical Books Limited, London, Fifth Edn., (1984).

10. Hodkinson A. “Oxalic Acid in Biology and Medicine” Academic press London, (1977)

11. Vermeulen, C.W., Grove W.J. Goetz., R., Ragins, H.D. and Correl, N.O. Experimental urolithiasis I Development of calculi up of foreign bodies surgically into bladder of rats, J. Urol., 64,541-548, (1950)

12. Gill, W.B. and Roma, M.J, determination of supersaturation levels and crystallization rates of calcium oxalate from urine of normal and stone formers: Effects on dialyzable materials, J. Surg., Res., 101, 45-49, (1976).

13. Prasad, K., Abraham, R., Bharathi, K. and Srinivasan, K.K. Evaluation of Homonia riparia Lour. For antiurolithiatic activity in albino rats, Int J. Pharmacognosy., 35,278-283, (1997)

14. Hautman, R. and Lehman, A. Internal distribution of oxalic acid, calcium, sodium and potassium in man, Eur.J. Clin, Invest., 10,173-176, (1980).

15. Bhaskar, R., Varalakshmi, P. and Amsarlni, R. Changes in tissue enzymes produced b coleus aromaticus in experimental urolithiasis, Ind. Drugs, 29,254-258, (1992).