Research Article

In-vitro Anti-Urolithiatic Activity of Corn Silk of *Zea Mays*

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ABSTRACT

Kidney stone is one of the most important problems in different countries over the world. They are affected by different factors like nutrition, age, drug history and other environmental and family factors. Locally, corn silk used as decompose of stones. This study proved aq. extracts of corn silk of *Zea mays* executed on generated calcium oxalate crystals by homogenous precipitation method for in-vitro anti-lithiatic activity. The aq. extracts of corn silk of *Zea mays* as shown significant activity on comparison to the synthetic drug Spironolactone, furosemide and poly-herbal formulation Cystone. Corn silk was playing an important physical role in treatment by increasing the contraction of smooth muscles a led to increase the urinary output and increased the percentage the passage of urinary stones through the urinary tracts.

Keywords: Corn silk of *Zea mays*, Spironolactone, Cystone, antilithiatic.

INTRODUCTION

Urolithiasis otherwise urinary calculi a pathogenic continues to be more or less of an ambigue and the predicament found to an ancient and worldwide distributed. The different calculi are painful urinary disorders that start as salt/chemical crystals which precipitate out from urine. Under normal circumstances, the urine contains substances that prevent crystallization but for patients with this condition, these inhibitory substances are ineffective. Tiny crystals will pass out along with the urinary flow without causing problems. At least few of people will pass a kidney stone during their lifetime, producing some of the most severe pain possible, by increasing the stone concentration in the kidney. If the stone is large enough to block the tube (ureter) and stop the flow of urine from the kidney, it must be removed by surgery or other methods. It is also called Renal Calculus. Symptoms usually begin with intense waves of pain as a stone move in the urinary tract. Typically, a person feels a sharp, cramping pain in the back and side in the area of the kidney or in the lower abdomen. Sometimes nausea and vomiting occur. Later, pain may spread to the groin. The pain may continue if the stone is too large to pass, blood may appear in the urine and there may be the need to urinate more often or a burning sensation during urination. If fever and chills accompany any of these symptoms, which may lead to infections.[1]

The plant drugs survey of corn silk of *Zea mays* narrates that, the drug has been utilized for preclinical and clinical activities. *Corn* silk of *Zea mays* is a member of the family Poaceae.

Corn silk is a rich source of potassium, soothing, relaxing diuretic and a wonderful remedy for acute inflammation of the urinary system, such as cystitis, urethritis and prostatitis.[2,3,4] Also helping the passage of urinary stones Corn silk encourages urination, while the potassium in the herb offset potassium loss caused by increased urination. It contains flavonoids (maysin), Allantoin, Alkaloids, Saponins, Volatile oil, Mucilage, Vitamins B, C and K, Silicon.[5] It also has moderate amounts of Iron, Zinc, Potassium, Calcium, Magnesium and Phosphorus Corn silk works mainly in the urinary tract.[6] The saponins largely act as anti-inflammatory in the body and the allantoin as a healing agent, with the mucilage giving a demulcent or soothing effect to irritated tissues. The potassium balances out the diuretic effect of the herb, which is used in conditions of water retention. Their combined action is useful for a number of urinary tract conditions, such as cystitis and prostatitis. Vitamin K is a fat soluble vitamin that is essential for blood clotting within the body.[7]

Spironolactone is a synthetic 17-lactone drug which is a renal competitive aldosterone antagonist in a class of pharmaceuticals called potassium-sparing diuretics, used primarily to treat heart failure, ascites in patients with liver disease, low-renin hypertension, hypokalemia, and Conn's syndrome. On its own, spironolactone is only a weak diuretic, but it can be combined with other diuretics. Furosemide, a 'water pill,' is used to reduce the swelling and fluid retention caused by various medical problems, including heart or liver disease. It is also used to treat high blood pressure. It causes the kidneys to get rid of unneeded water and salt from the body into the urine. The above synthetic drugs Spironolactone and Furosimide been used as a diuretic and most of the diuretic drugs have been used in urolithiasis treatment, so, it is been tried and compared with plant drug extract for the observation.

Cystone has been reported to be useful in urolithiasis, as it corrects the crystalloid and colloid balance and also acts by disintegrating calculi and crystals. The action of disintegration is due to its action on mucin, which binds

particles together in a calculus. In addition, Cystone helps by flushing the urinary passage by virtue of its diuretic action. It also relaxes smooth musculature of the urinary tract, thereby relieving spasms. Thus the patient is relieved of the agony of colics and pain. Cystone works in cases of urolithiasis due to its comprehensive activity that leads to downward passage of calculi.

The formulation of Cystone (The Himalaya Drug Co.) contains extracts of:

Didymocarpus pedicellata 65 mg

Saxifraga ligulata 49 mg

Rubia cordifolia 16 mg

Cyperus scariosus 16 mg

Achyranthes aspera 16 mg

Onosma bracteatum 16 mg

Vernonia cinerea 16 mg

Shilajeet (purified) 13 mg

Hajrul yahood bhasma 16 mg

Hajrul yahood bhasma is prepared with *Ocimum basilicum, Tribulus terrestris, Mimosa pudica, Dolichos biflorus, Pavonia odorata, Equisetum arvense, Tectona grandis* seed. The tablet formulation which has been used to compare the effect against drugs and exracts used.[1]

MATERIALS AND METHODS

Plant materials and Preparation of extract

Corn silk of *Zea mays* was collected from Yavatmal District for the study. Corn silk was obtained from local market and used as infusion fresh or dried in urinary tract infections. An aqueous extraction was performed by adding 200 ml boiling water to 10 GM corn silk, filtering after 20 min and then extract was filtered using filter paper (Whatman no.1) and then filter was collected. The remaining residue was re-extracted twice and then the two extract were combined. The solvent was removed by rotary evaporator at 50ºC to obtain semi dry extract. The aq. Extract was then freeze dried for 24 hrs. Dried extract were placed in a bottle, stopped and then stored at -20 ^{0}C until used.

Experimental Work

The experiment consisted of the following test tubes of 10 ml capacity and marked the tubes as control and tests into 5 groups, each group has 6 test tubes, in each tube 1ml of calcium chloride anhydrous and 1ml sodium oxalate were added to the tubes and 2 ml of tris buffer (disodium hydrogen phosphate and potassium dihydrogen phosphate) adjusted at 7.4 pH which to the kidney pH and incubated at 36.7ºC over night. The next day the test tubes were centrifuged for 10min to decant to remove top liquid layer. The calcium oxalate crystal formed in the test tube were checked using the compound microscope under 45x magnification, the crystal formed were resembling the prisms shape, to this the extracts of plant corn silk of *Zea mays* were induced to the tubes and at the same quantity the synthetic drugs Spironolactone, Furosemide and the Poly herbal formulation Cystone were administered to the test tube, all the above treating agents was administered as aqueous suspension using tween 60 as suspending agent and again it was incubated 36.7ºC for 3 days on the fourth day all the test tubes were taken and checked for dissolution of the crystals under the microscope at the same superimposition, to this test a drop of con HCl were added to separate the oxalate ion calcium and both the ions were spectroscopically analyzed[1].

Groupings: Group- I ⇒ generated calcium oxalate crystals and referred as control, Group- II ⇒ generated calcium oxalate crystals + 5ml Furosemide, Group- III ⇒ generated calcium oxalate crystals + 5ml Spironolactone, Group-IV ⇒ generated calcium oxalate crystals + 5ml Cystone, Group-V ⇒ generated calcium oxalate crystals + 5ml aq. Extract of corn silk.

Elemental Ions Analysis

Test for oxalate

The determination of oxalic acid in 0.5ml of generated crystals samples, the co-precipitated oxalic acid with calcium sulphate, which is reduced to glycollic acid by boiling with dilute sulphuric acid and a zinc pellet and estimated colorimetrically with chromotropic acid at 570 nm.

Test for Calcium

In acid medium, calcium binds with O-Cresolphthalein Complexone (O-CPC) to produce a purple colour, which absorbs at 570 nm is proportional to the concentration of calcium[1].

Microscopical studies

On revise, before adding the dilute HCl, the different extracts and the other agents treated on the regenerated calcium oxalate crystals in test tubes were observed under the 10X magnification using the photographic microscope and pictures were taken and pragmatic effects of the agents were studied. the crystals formed is rated on assumption as per to the scores ranges from 0-4 marks which on comparison to the control group-1 with the others treated groups and the crystals formation are denoted by the arrow marks.

Data analysis

The data of urinary and renal parameters were expressed as mean ± SEM. The results were analyzed statistically using one way ANOVA. The minimum level of significance was fixed at $P< 0.05$. Comprasion were made between the group I with the groups II to V.

RESULTS AND DISCUSSION

The in-vitro lithiatic activity which has been carried, where the calcium oxalate crystals was generated by the

sodium oxalate and calcium chloride on incubation at 36.70C with tris phosphate buffer at 7.4 pH. The generated crystals were treated with the different agents mentioned above in experimental part into five groups and group-I kept as control and others groups as treated, the estimation of calcium and oxalate were carried out, on comparison, the group-I with other groups found that the aq. Extract of corn silk of *Zea mays* has shown significant and better action in dissolving the crystals, the cystone and spironolactone which has shown restrained activity, where as furosemide were much equivalent to the control and found non significant on measuring the ion content (Table1).

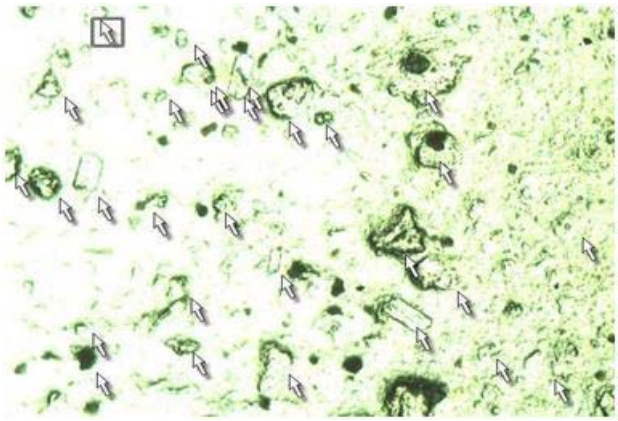

Figure 1: Control - Group-I

The huge number of calcium oxalate crystals creation were seen and scored 4.

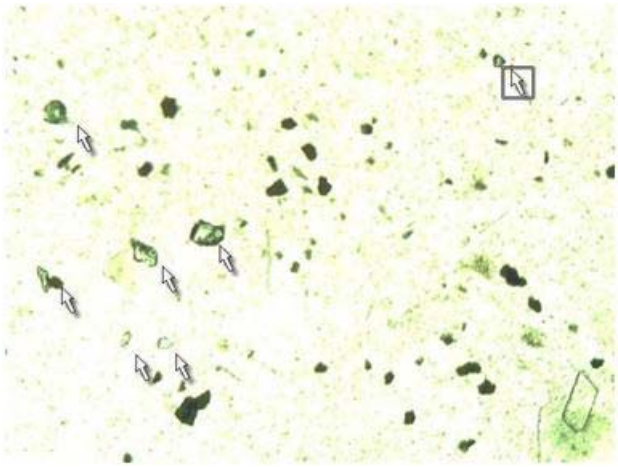

Figure 2: FUROSEMIDE Group II: The huge number of calcium oxalate crystals creation were not dissolved by the drug and scored 4.

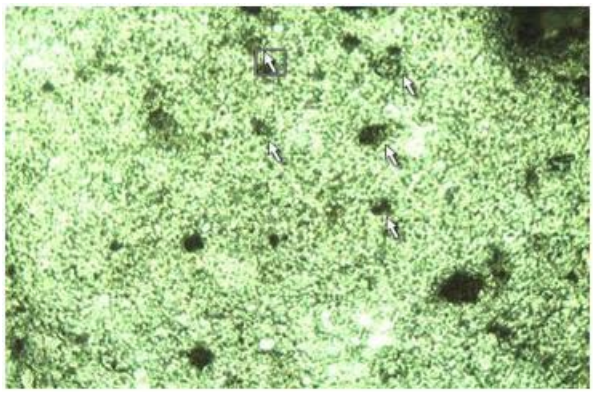

Figure 3: SIRANOLACTONE Group III: The number of calcium oxalate crystals dissolutions was less by the drug and scored as 2.

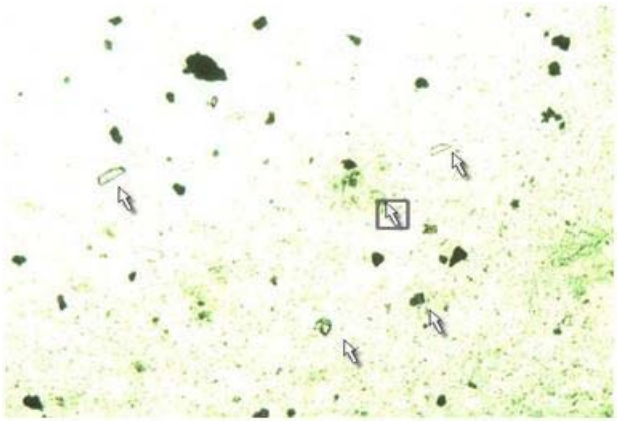

Figure 4: CYSTONE Group -IV The number of calcium oxalate crystals dissolution more the poly-herbal formulation and scored as 1.

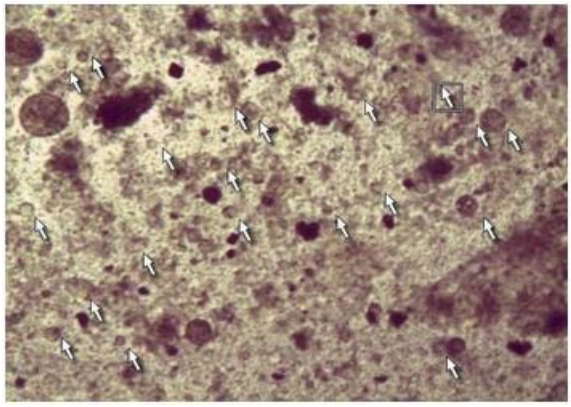

Figure 5: Aq. Extract of corn silk of *Zea mays* Group V: The huge number of calcium oxalate crystals creation found undissolved by the extract and scored 4.

Table 1: Effect of the drugs and extracts treated on generated calcium oxalate analysis

Parameters mg/generated crystals in test tube	Group- I Control Generated Calcium oxalate	Group- II 5mg/ml Furosemide	Group- III 5mg/ml Spiranolactone	Group- IV 5mg/ml Cystone	Group- V 5mg/ml Aq.extract of corn silk
Oxalate	15.02 ±0.45	14.78_{d} ±0.66	10.53 c±0.66	6.77±0.50	15.4d ±0.44
Calcium	6.20 ±0. 29	5.24_{d} ±0. 20	3.01c ±0. 25	2.66 ±0.21	5.84 d ±0. 31

Comparison were made between the group I with the groups II to XII; Statistical significance: a = <0.05, c = **P<0.01, d = ***P<0.001; P > 0.05.

CONCLUSION

Both the ions which was analyzed under visible spectroscopy on detail in-vitro study, it was found that the alcoholic extracts of the plants Corn silk of *Zea mays* has shown significant anti-lithiatic activity in dissolution of regenerated calcium oxalate crystals.

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