IJPHT Journal
Papers Having Good Impact

International Journal of Pharmacy and Herbal Technology (Online)

Home Page: https://www.ijprdjournal.com/

In-vitro Anti Urolithiasis Activity of Leaves extract of Coriander Sativum

Shirisha C. Komati, * Swati T. Mane, Sanjay K. Bais
Fabtech College of Pharmacy, Sangola
Tal-Sangola, Dist.-Solapur
Maharashtra -413307

ABSTRACT

The Dhanyaka, also known as the Coriandrum Sativum family Umbelliferae, is a well-known ayurvedic medicinal tree. Urolithiasis is a common disorder marked by the formation of stones in the urinary system. It can cause excruciating pain and lead to complications. Because natural remedies have fewer side effects than conventional treatments, there is growing interest in them despite the availability of conventional treatments. The leaves of the coriander plant, Coriandrum sativum L., have long been used in medicine for a number of ailments, including urinary tract issues. Kidney stones, also called urolithiasis, are a common condition that is characterized by the formation of stones in the urinary tract. Phytochemical tests are performed to detect the presence of the optional metabolites, for example, alkaloids, glycosides, flavonoids in leaves concentrate of Coriandrum sativum l utilizing the solvents Chloroform extract. The goal of research on anti-Urolithiatic agents is to find natural and artificial substances that can prevent the growth of new stones, dissolve existing ones, or lessen their recurrence.

According to the current in-vitro investigation, the Chloroform extract has appreciable result as compared to standard drug Neeri with a maximum inhibition and the Chloroform extract maximum inhibition, standard medicine (Neeri) medication has powerful anti-Urolithiatic activity.

Keywords: *Coriandrum sativum L, Urolithiasis, semipermeable membrane*

*Corresponding Author Email: - shirishakomati.3@gmail.com
Received on 10 July, 2024, Accepted 20 July, 2024

Please cite this article as: Komati Shirisha et. al. In-vitro Anti Urolithiasis Activity of Leaves extract of Coriander Sativum
International Journal of Pharmacy and Herbal Technology 2024.

INTRODUCTION

Alongside the surrounding flora and trees, human civilization developed. Humans use a variety of plants, including trees, shrubs, and herbs, for everyday needs like clothing, food, and shelter. Because of their therapeutic properties, several herbs have long been grown for food. One such herb, sativum, is used in cooking and has been linked to numerous medical benefits in scientific studies. Many plants fall under this category of sativum species, including Medicago sativa (alfalfa), Cucumis sativus (cucumber), Avena sativa (common oat) and Allium sativum (garlic). For coriander, there are numerous colloquial or colloquial names in addition to its scientific names. According to taxonomy, sativum species are members of the Umbelliferae (Apiaceae) family.[1]

After the crop was domesticated, numerous varieties were created by crossing it with wild counterparts. These species are easily recognized thanks to their distinctive morphology. Worldwide, the majority of Sativum species are used in cooking. Pickles, soups, curries, and seasonings are all made with it. There are numerous reports that suggest their medicinal qualities in addition to their food-grade applications. The plant body contains a variety of essential oils, each of which contains a unique set of phytometabolites with therapeutic potential. Rich in many kinds of minerals, vitamins, and proteins, sativum boasts a high nutritional value.[2]

All plant parts found in rich in secondary metabolites which are responsible for a variety of therapeutic effects, including kidney stones, hypnotic activity, anti-microbial, antioxidant, anti-diabetic, anti-convulsant effects. The plant body wide variety of commercially significantsecondary metabolites that are used in production of pharmaceuticals. These plant species areuseful in the manufacturing of lotions and perfumes and are used in the perfume industry for their aroma. As a preservative, food oil derived from sativum is used to lessen the lipid peroxidation of processed meat products. Bacterial contaminations are mitigated by the antifungal properties of sativum extracts. Thus, the food industry uses sativum extracts extensively. [3,4]

Urolithiasis, kidney stone formation, is a common problem and the third most common malady among urinary diseases, with no guarantee of effective treatment and a high recurrence rate of 1%–5% in Asia. According to reports, 10%–12% of people in developed countries (10% of male and 3% of female) will develop a urinary stone at some point in their lives. This disorderhas a multifactorial etiology that includes genetics, diet, and a lack of physical activity. Although the mechanisms underlying the formation of kidney stones are unknown, they are primarily formed by the crystal aggregation, nucleation, and growth of insoluble particles suchas calcium, magnesium ammonium phosphates, uric acid, and cystine. The most common kidney stones are calcium containing stones, which account for 75%–90% of all kidney stonesin both male and female.[5]

Despite the fact that urolithiasis can be treated with surgical removal, which is more expensiveand has a high financial burden, more than half of patients have a stone recurrence within five years after their first treatment. Because both surgical techniques and pharmacotherapy options are limited, it is worthwhile to explore new pharmacological therapies for the treatment of kidney stones. Several recent anthropological studies have suggested that diets rich in spices, vegetables, and fruits may be beneficial for preventing urolithiasis formation. Herbal and natural folk medicine products have been used for centuries in every culture on the planet. Innumerable medicinal plants with antispasmodic, diuretic and antioxidant properties inhibit crystallization, nucleation, and aggregation, making them effective in the treatment of urolithiasis.[6]

Coriandrum sativum L. (Apiaceae) is a fragrant, antioxidant-rich herb that has many culinary uses and health benefits. The entire plant is edible, but the seeds have a reported to have widespread application in medicine. The seeds are used in folk medicine to treat a variety of ailments. Though both the samples mentioned have been widely utilised in traditional medicine systems separately, so far, the claims of decoction prepared as a home remedy for treating urinary tract diseases especially for urolithiasis have not been confirmed scientifically. The extant study is designed to appraise the in vitro anti-urolithiatic and antioxidant activity of thepolyherbal formulation prepared. [7,8]

MATERIAL AND METHOD

Collection and Preparation

The fresh leaves of Coriandrum sativum L were collected from the botanical garden. The leaves of Coriandrum sativum L were shade dried at room temperature using shade drying for 4 days. The dried parts were later coarsely powdered with help of electric grinder after passed through sieve no 20 to obtain coursepowder. Then this powder was stored at room temperature to protect it from moisture.[9]

Authentication of plant

The taxonomical identification (authenticated) by Dr Tembhurne R. R. Dept of Botany, Sangola College, Sangola Tal-Sangola, Dist- Solapur, Maharashtra, India.

Extraction

In a sterile Soxhlet apparatus, 50 g of dried powdered *C. sativum* leaveswere taken separately. 250 mL of chloroform then added in the bottle, and the extract left to extract for 4–5 hours at a constant temperature of 80°C.The extraction is finishedafter enough cycles. After the device has cooled, disassemble it. To get rid of any solid particles, filter the extract. Using a rotary evaporator, evaporate the solvent to produce a concentrated extract. The concentrated extract should be kept in a cool, dark place until it is needed for additional analysis or use. One suitable containerto use is a glass bottle with an amber colour.[10]

Phytochemical screening

Qualitative phytochemical test

The preliminary chemical test was carried out for the extracts of Coriandrum sativum leavesto identify the presence of various phytoconstituents.

Detection of Alkaloids

Dragendroff's Test

The reaction was carefully watched as 2 ml of Dragendorff's reagent were added to 1 ml of filtrate. A discernible yellow ppt signifies a favorable test outcome.

Hager's test

In a test tube, add a few drops of Hager's reagent to 1ml of filtrate. Positive results areindicated by the yellow crystalline precipitate.

Detection of flavonoids

Lead acetate solution test

In test tube, add a drops of lead acetate solution to 1 ml of filtrate. Success is indicated by the yellow precipitate.[11]

Detection tannins

After dissolving the plant material (5 mg) in 5 ml of distilled water, a drop of a neutral 5% ferric chloride was added. Tannin was indicated by the formation of a blue-green tint.[12]

Detection of Carbohydrate

Molish test

Extract a few milliliters, mix in a few drops of alpha naphthol solution in alcohol, shakewell, and then pour concentrated H_2SO_4 out of the side of the test tube. The junction of two liquids produced a violet ring.

Detection of saponins

For fifteen minutes, plant extracts were shaken in a graduated cylinder with two milliliters of distilled water added. The production of one centimeter of foam revealedthe presence of saponins.[13]

Detection of Glycoside

Legal's test

A 10% ammonia solution, 3 milliliters of chloroform, and 2 milliliters of plant extract were combined. The glycosides presence was indicated by pink appear

Detection of terpenoid

Extract of 0.5ml was carefully mixed with 2ml of concentrated sulfuric acid and 2ml of chloroform. A reddish-brown coloration formed at interface side, indicating presence of terpenoid.[14]

Detection of coumarin

The plant extracts were mixed with one milliliter of 10% NaOH. creation of a yellowhue suggested the presence of coumarins.[15]

In vitro Antiurolithiatic activity

Principle

The principle of anti-urolithiasis activity describes the underlying mechanism by which a medication acts against urolithiasis, or formation of urinary stones in urinary system. Depending on how the chemical under study acts, the specific principles might change. Inhibition of stone formation: Certain medications have an anti-uriolithiatic effect by stopping the formation of kidney stones. For instance, they might stop crystal nucleation or growth, which would impede the crystallisation process. This can be achieved by modifying the solubility of elements that form stones, such as phosphate, calcium, or oxalate, or by interfering with the adhesion or aggregation of crystals.[16]

Evaluation of Anti-urolithiasis Activity by Calcium Oxalate Dissolution Method

Titrimetric method

A dissolving technique called titrimetric method is as follows: standard Neeri and different plant extracts are added to artificially prepared calcium oxalate crystals in semi-permeable membranes egg as control. It was then left to incubate for two hours at 37 ºC after being submerged in 0.1 M Tris buffer. When the endpoint turns light pink, after two hours, remove the contents of the semi per membrane and added two milliliters of 1 N sulfuric acid that has been titrated against 0.9494N potassium permanganate. The total amount used in experimentat the beginning is subtracted from amount of undissolved calcium oxalate that remains in order to calculate total amount of disappearance calcium oxalate by various extracts 7-9. The dissolution procedure consisted of 3 steps.[17]

Using homogenous precipitation, experimental (stones of calcium oxalate) are prepared.

Using eggs to prepare a semi-permeable membrane.

Calcium oxalate estimation using the titrimetric method

Step1

Preparation for experimental kidney stones (Calcium oxalate stones) byHomogenous precipitation

Sodium oxalate (1.34g) and calcium chloride dihydrate (1.47 g) were dissolved in 100 milliliters of distilled water and 100 milliliters of 2 N sulfuric acid, respectively. Each was equally mixed in a beaker to precipitate calcium oxalate. Traces of sulfuric acid are absent from the precipitate that the ammonia solution produces. Following a wash with distilled water, dry the precipitates at 60 degree for four hours.[18]

Step 2

Preparation of Semi-permeable Membrane from Eggs

Between egg's calcified shell, albumin, and yolk is a semi-permeable membrane. To get all thecontents out of the eggs, the apex was punctured with a glass rod. The eggs were thoroughly rinsed with purified water, and then they were left in a beaker containing two milligrams of hydrochloric acid for the entire night to decalcify. Following that, distilled water was used to clean it, it was placed in a wet ammonia solution for a while to neutralize any leftover acid residue, rinsed with distilled water, and then chilled at a pH of 7.4.[19]

Step 3

Estimation of Calcium Oxalate by Titrimetric

This made it possible to calculate the percent of calcium oxalate that dissolved.

Group I: Null; merely 10 milligrams of calcium oxalate

Group II: Normal;10 milliliters of Neeri and 10 milligrams of calcium oxalate

Group III: *Coriandrum sativum L* chloroform extract and 10 mg of calcium oxalate were examined.

Group IV: Test consists of 10 milliliters of methanolic extract from *Coriandrum Sativum L* mlof calcium oxalate. a suturing model, the semi-permeable membrane was precisely packed with 10 mg of calcium oxalate and 10 ml of extract, compound, or standard. A conical flask containing 100 ml of 0.1 M Tris HCl buffer in conical flask was used to suspend the membrane.[20]

One group of subjects was given a dose of calcium oxalate of just 10 mg as a negative control.As a result, samples from each group were placed in a conical flask and placed in an incubatorfor approximately 7 to 8 hours after being preheated for 2 hours to 37 °C. Two milliliters of 1 N sulfuric acid were added to a conical flask containing semi per membrane content of each group. After that, 0.9494 N KMnO4 was titrated until a pale pink obtained. The total amount used in the experiment at the starting is subtracted from amount of undissolved calcium oxalatethat remains in order to calculate total amount of disappear calcium oxalate by solvent extracts. [21,22]

RESULT

Phytochemical evaluation:

Evaluation of phytochemicals is the detection of presence or absence of phytochemicalst in the herbal drug extracts of *Coriandrum sativum L.*

Sr No.	Chemical Constituents	Tests	Chloroform extract
1	Alkaloids	Dragendroff's Test	++
		Hager's Test	+++
2	Flavonoid	Lead Acetate	+
3	Tannis	Ferric chloride	-
4	Carbohydrate	Molish Test	+
5	Soponins	Foam Test	+
6	Glycoside	Legal's Test	+
7	Terpenoids	Salkowski test	+
8	Coumarin	Coumarin's Test	++

Table No. 1: Qualitative phytochemical test for the Coriandrum Sativum L

(-) Absent, (+) Present, (++) Strongly Present

Phytochemical tests are performed to detect the presence of the optional metabolites, for example, alkaloids, glycosides, flavonoids in leaves concentrate of *Coriandrum sativum l* utilizing the solvents Chloroform extract of *Coriandrum sativum* leaves in that the chloroformextract shows complete positive tests for alkaloids, flavonoids, glycosides, saponin, coumarins.

So, the leaves extract of *Coriandrum sativum* contain the alkaloids, saponin, coumarins as a secondary metabolite.

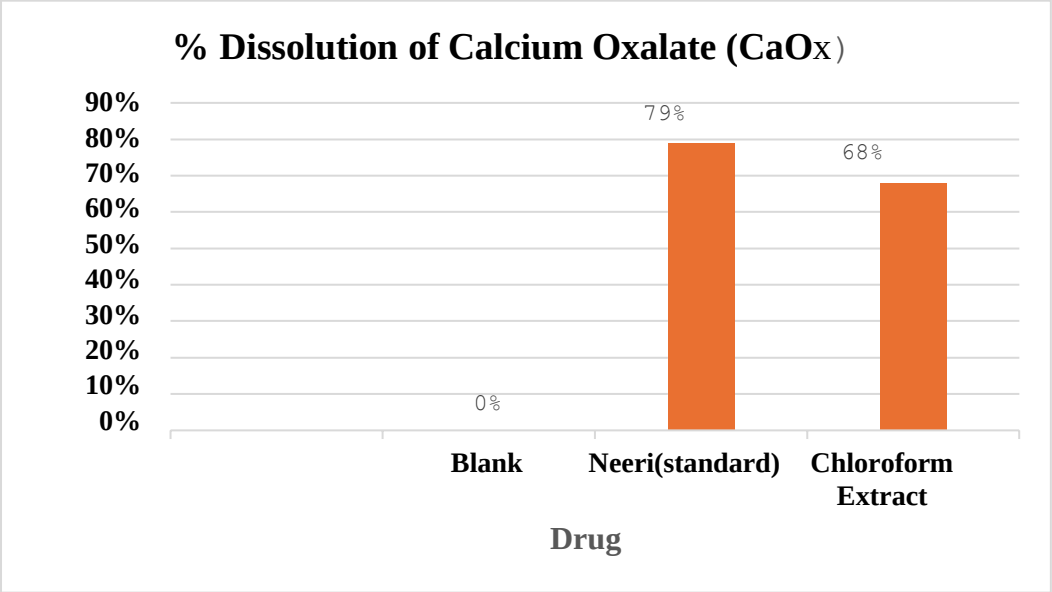
In vitro Antiurolithiatic study

Calcium oxalate dissolution method

The percentage of dissolution of Chloroform extract was calculated from dissolved & undissolved Calcium Oxalate

Drugs	Undissolved calcium Oxalate (mg)	% dissolution
Blank	0	0%
Neeri (standard)	2.1	79%
Chloroform Extract	3.2	68%

Table No. 2: *In-Vitro* Urolithiatic Study of *Coriandrum Sativum L* Leves extract



Graph No.1: Dissolution of Calcium Oxalate (Ca ox) of Coriandrum Sativum L

According to the current *in-vitro* investigation, the Chloroform extract has appreciable result as compared to standard drug Neeri with a maximum inhibition of 79% and the Chloroform extract maximum inhibion is 69%, standard medicine (Neeri) medication has powerful anti- urolithiatic activity.

DISCUSSION

The alkaloids test is carried out by Dragendorff's reagent which shows moderately present of alkaloids and also Hager's test is carried out which is strongly present. Flavonoids test is doneby using lead acetate which shows positive result. Molish's test is carried out to detect carbohydrates which shows positive results in these tests. To detect saponin foam test is carried out which shows positive results. And glycosides and terpenoid are detected using legals test and salkowski test which shows both positive results and finally coumarins test is carried out which is moderately present. The tannins are detected by ferric chloride test which shows negative results.

These two findings compared and validated the fact that shows plant extract had strong anti-urolithiatic activity as near standard (Neeri) medicine. The titrimetric approach reveals that the dissolved calcium oxalate in mg is low (3.2 mg) when compared to the standard (2.1mg). When the percentage of dissolution of *Coriandrum sativum* L. Chloroform extract is compared to the standard (Neeri), the percentage of dissolution is lower.

CONCLUSION

The first study evaluates the mechanism by which a polyherbal formula derived from *C. sativum* can prevent shrinkage of calcium oxalate crystals from forming. The polyherbal formulation employed in this work inhibits the rate of dissolution and growth of crystals in vitro in addition to decreasing crystal deposition.

It proved that a phytochemical supplement included in the prepared polyherbal formulation was useful for research and treatment of urolithiasis. Based on our in vitro laboratory analysis of polyherbal formulation made from test *C. sativum* and the knowledge of traditional healers in South India, the supporting evidence forthe knowledge of the preparation of the polyherbal formulation demonstrated and conveyed.

The study of the anti-urolithiatic activity of *Coriandrum sativum L.* (cilantro) leaves demonstrates promising results in preventing and managing urolithiasis. The bioactive compounds present in coriander leaves, such as flavonoids, alkaloids, and phenolic acids, exhibit significant inhibitory effects on the formation and growth of urinary stones. These compounds likely contribute to reducing oxidative stress, altering urinary pH, and promoting diuresis, thereby aiding in the dissolution and prevention of kidney stones. Additionally, the natural origin of coriander leaves suggests a safer profile with minimal side effects compared to synthetic drugs. Therefore, *Coriandrum sativum L.* leaves have the potential to be developedas an effective natural remedy for urolithiasis, offering a complementary or alternative approach to conventional treatments. Further clinical studies are warranted to validate these findings and optimize the therapeutic application of coriander leaves in urolithiasis management. The leaves extract of *Coriander Sativum* may be shows the anti-urolithiasis activity.

CONFLICTS OF INTEREST

Nil.

FUNDING

No financial interest

REFERENCE

1. Aggarwal, A., Tandon, S., Singla, S.K., Tandon, C. Diminution of oxalate induced renal tubular epithelial cell injury and inhibition of calcium oxalate crystallization in vitro by aqueous extract of Tribulus terrestris. Int. Braz. J. Urol, 2010: 36 (6): 480-489.
2. Atmani, F., Slimani, Y., Mimouni, M., Hacht, B. Prophylaxis of calcium oxalate stones by Herniaria hirsuta on experimentally induced nephrolithiasis in rats. BJU Int, 2003: 92 (1): 137-140.
3. Bahmani, M., Baharvand-Ahmadi, B., Tajeddini, P., Rafieian-Kopaei, M., Naghdi, N. Identification of medicinal plants for the treatment of kidney and urinary stones. J. Ren. Inj.Prev, 2016: 5 (3): 129–133.
4. Chaudhary, A., Singla, S.K., Tandon, C. in vitro evaluation of Terminalia arjuna on scalcium phosphate and calcium oxalate crystallization. Indian J. Pharm. Sci, 2010: 72 (3): 340.
5. Costa-Bauzá, A., Perelló, J., Isern, B., Sanchis, P., Grases, F. Factors affecting calcium oxalate dihydrate fragmented calculi regrowth. BMC Urol, 2006: 6 (3):1–7.
6. Eidi, M., Eidi, A. Effect of Coriander (Coriandrum sativum L.) seed ethanol extract in experimental diabetes. Nuts and Seeds in Health and Disease Prevention. J. Science Direct. 2011, 47,395-400

7. Farook, N.A., Mozhiyarasi, P., Nalini, R., 2006. Inhibition of mineralization of urinary stone forming minerals by medicinal plants. Eur. J. Chem, 2006: 3 (3): 182–185.
8. Gindi, S., Methra, T., Chandu, B.R., Boyina, R., Dasari, V. Antiurolithiatic and in vitro antioxidant activity of leaves of Ageratum conyzoides in rat. World J. Pharm. Pharm. Sci, 2013: 2: 636–649.
9. Gnessin, E., Lingeman, J.E., Evan, A.P., 2010. Pathogenesis of renal calculi. Turkish J. Urol, 2010: 36 (2): 190–199.
10. Goraya, N., Wesson, D.E. Dietary interventions to improve outcomes in chronic kidney disease. Curr. Opin. Nephrol. Hypertens, 2015: 24 (6): 505–510.
11. Guzel, A., Yunusoglu, S., Calapoglu, M., Candan, I.A., Onaran, I., Oncu, M., Ergun, O., Oksay, T. Protective effects of quercetin on oxidative stress-induced tubular epithelial damage in the experimental rat hyperoxaluria model. Medicinal, 2021: 57 (6): 566.
12. Harper, J.D., Cunitz, B.W., Dunmire, B., Lee, F.C., Sorensen, M.D., Hsi, R.S., Thiel, J., Wessells, H., Lingeman, J.E., Bailey, M.R. First in human clinical trial of ultrasonic propulsion of kidney stones. J. Urol, 2016: 195 (4): 956–964.
13. İlhan, M., Ergene, B., Süntar, I., Özbilgin, S., Saltan Çitoğlu, G., Preclinical evaluation of antiurolithiatic activity of Viburnum opulus L. on sodium oxalate-induced urolithiasis rat model. Evid. Based Complement. Altern. Med. 2014, 57(8), 103
14. Jha, R., Ramani, P.T., Patel, D., Desai, S., Meshram, D. Phytochemical analysis and in vitro urolithiatic activity of Peltophorum pterocarpum leaves (DC) Baker. J. Med. Plants Stud, 2016: 4(3): 18–22.
15. Jincy, B.M. Phytochemical screening and determination of in-vitro antilithiatic activity ofSolanum anguivi Lam. Int. J. Insti Pharm Life Sci, 2014: 4 (2): 134–146.
16. Kadifkova Panovska, T., Kulevanova, S., Stefova, M. In vitro antioxidant activity of some Teucrium species (Lamiaceae). Acta Pharm, 2005: 55 (2): 207–214.
17. Khandelwal, K, Laribi, B., Kouki,K., M'Hamdi, M., Bettaieb,T,.Coriander (Coriandrum sativum L.) and its bioactive constituents. Practical Pharmacognosy. Pragati Books Pvt. Ltd. Fitoterapia, 2015: 103: 9–26.
18. Meschi, T., Nouvenne, A., Ticinesi, A., Prati, B., Guerra, A., Allegri, F., Pigna, F., Soldati, L., Vezzoli, G., Gambaro, G., Lauretani, F. Dietary habits in women with recurrent idiopathic calcium nephrolithiasis. J. Transl. Med, 2012: 10 (1):1–8
19. Ashok Kumar, B.S., Vamshi Krishna, N., Raghavendra, B.S., Gopisetty, S., Antiurolithiatic activity of Inji Rasayanam: a Siddha formulation. Asian J. Pharm. Techno. Innov, 2014: 2 (7): 87–90.
20. Yadav, A., Das, R., Mehta, D.K., 2021. Benefaction of herbals in the management of urolithiasis. Curr. Tradit. Med, 2021: (4): 541–551.
21. Wesson, J.A., Worcester, E.M., Wiessner, J.H., Mandel, N.S., Kleinman, J.G., 1998. Control of calcium oxalate crystal structure and cell adherence by urinary macromolecules. Kidney Int.,2018: (4): 952–957.
22. Pathak Nimish, L., Kasture Sanjay, B., Bhatt Nayna, M., Rathod Jaimik, D., 2011. Phytopharmacological properties of Coriander sativum as a potential medicinal tree: an overview. J. Appl. Pharm. Sci. 1, 2011: (4): 20–25.