

FORMULATION AND EVALUATION OF POWDER OF CELOCIA ARGENTEA USED TO TREAT KIDNEY STONE

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Abstract

Urolithiasis is one of the most common disorders affecting the urinary system and is characterized by the formation of crystalline stones in the kidneys due to supersaturation of minerals in urine. The disease is associated with severe pain, urinary obstruction, hematuria, and recurrent infections. Conventional treatments such as surgery and lithotripsy are expensive and may produce adverse effects or recurrence. Hence, herbal medicines are gaining importance due to their safety, effectiveness, and fewer side effects. The herbal powder was prepared using dried and powdered plant material followed by evaluation of organoleptic and physicochemical parameters. Phytochemical screening was carried out to identify the presence of active constituents responsible for therapeutic activity. The formulation may help in reducing calcium oxalate crystal formation, promoting urine flow, and preventing recurrence of kidney stones

Keywords: Celosia Argentea, Kidney stones (Urolithiasis), Herbal formulation, Antiuro lithiatic activity, Phytochemical screening

Introduction

Urolithiasis or kidney stone disease is one of the most common disorders of the urinary system. It is characterized by the formation of hard crystalline masses in the kidneys due to supersaturation of urine with minerals such as calcium oxalate, calcium phosphate, uric acid, and cystine. Kidney stones may vary in size and can obstruct the urinary tract, causing severe pain, hematuria, burning micturition, nausea, vomiting, and recurrent urinary infections. The prevalence of kidney stone disease has increased worldwide due to changes in dietary habits, dehydration, sedentary lifestyle, metabolic disorders, and environmental factors. Recurrence of kidney stones is common, and conventional treatments such as lithotripsy and surgery are often expensive and associated with adverse effects. Therefore, herbal medicines are gaining importance because of their safety, affordability, and therapeutic potential.

MATERIAL AND METHODS



Fig 2: *Celosia Argentea*

Celosia argentea Linn. belongs to the family *Amaranthaceae* and is commonly known as Cock's Comb or Silver Cockscomb. The seeds of this plant are widely used in traditional Ayurvedic and Chinese medicine for the treatment of various diseases such as kidney stones, urinary disorders.

Biological Source : The drug consists of dried mature seeds of *Celosia argentea* Linn., family *Amaranthaceae*.

Taxonomical Classification :

Kingdom – Plantae

Division – Magnoliophyta

Class – Magnoliopsida

Order – Caryophyllales

Family – *Amaranthaceae*

Genus – *Celosia* Species – *Celosia argentea*

Table No 1 ingredient and their category

Sr.no.	Ingredients	Category
1.	Celocia Argentea	Active Ingredient
2.	Sugar Powder	Switning Agent
3.	Talc	Glidant
4.	Aerosil	Glidant

Collection of drugs

The plant material (*Celosia argentea*) was collected from a suitable source. It was authenticated by a qualified botanist. The plant material was washed, shade-dried, and stored properly.

Preparation of powder

Accurately weighed quantities of all ingredients were taken. The formulation was prepared by geometric mixing method: First, *Celosia argentea* powder was mixed with sugar powder. Then talc was added and mixed thoroughly. Finally, aerosol was incorporated to improve flow properties.

Preparation of extraction

Weigh 100 g of powdered seed material. Transfer it into a clean conical flask. Add 500 mL of 70% ethanol (or methanol) as solvent. Seal the flask and keep it for 72 hours. Shake intermittently to enhance extraction. Filter the extract using muslin cloth followed by Whatman filter paper No. 1. Collect the filtrate. Evaporate the solvent using a water bath at 40–50°C until a thick extract is obtained. Dry the concentrated extract in a desiccator or hot air oven at low temperature. Record the weight of the dried extract.

Phytochemical Screening:

PRE FORMULATION TESTS (Pre-formulation Studies These tests are carried out before preparing the herbal churna powder.

A. Identification of Plant Material

- Morphological examination
- Authentication of seeds

B. Organoleptic Evaluation

- Color
- Odor
- Taste
- Appearance

C. Drying and Moisture Content

- Loss on drying (LOD)
- Moisture determination

D. Phytochemical Screening

Tests for:

- Saponins
- Alkaloids
- Flavonoids
- Tannins
- Glycosides

E. Powder Characterization

- Particle size analysis
- Powder flow property

F. Ash Value Determination

- Total ash
- Acid insoluble ash
- Water soluble ash

G. Extractive Value

- Water soluble extractive value
- Alcohol soluble extractive value

Shake well and allow the layers to Separate the chloroform layer and add a few drops of dilute ammonia solution. Formation of reddish-pink color indicated presence of Anthraquinone.

Preparation of Powder

1. seeds were shade dried for 5–7 days at room temperature to preserve active phytoconstituents
2. were cleaned properly to remove dust, dirt, foreign particles, and impurities using distilled water.
3. Dry the material under shade drying (preferred) to preserve active constituents.
4. Use a grinder, pulverizer, or mortar & pestle.
5. Grind the dried material into a fine powder.
6. If multiple ingredients are used, mix them thoroughly in proper proportion.
7. Store the powder in airtight containers.

Formulation Table

Table No: 2 Formulation table

Sr. No.	Ingredients	Batch F1	Batch F2	Batch F3
1.	Celocia Argentea Powder	16g	15 g	14 g
2.	Sugar Powder	3 g	4 g	5 g
3.	Talc	0.5g	0.5 g	0.5 g
4.	Aerosil	0.5 g	0.5 g	0.5 g

Evaluation parameter

1. Angle of repose (θ):

Angle of repose is defined as the maximum angle possible between the surface of a pile of the powder and horizontal plane. The frictional force in a loose powder or granules can be measured by angle of repose.

It is an indicative of the flow properties of the powder.

$$\tan \theta = H / R$$

$$\theta = \tan^{-1} (H/R)$$

Where,

θ is the angle of repose

H is height of pile

R is radius of the base of pile

The powder mixture was allowed to flow through the funnel fixed to a stand at definite height (H). The angle of repose was then calculated by measuring the height & radius of the heap of powder formed. Care was taken to see that the powder particles slip & roll over each other through the sides of the funnel. Relationship between angle of repose and powder flow property.

2. Flow Rate:

Flow rate of a powder has been defined as the rate at which the particular mass emerges through the orifice of funnel of a suitable diameter. The flow rate for granules of each formulation was determined by pouring accurately weighed quantities of granules in funnel with an orifice of 8 mm diameter. The time required for the complete granule mass to emerge out of the orifice was recorded using a stopwatch.

3. Bulk Density:

The bulk density was obtained by dividing the mass of a powder by the bulk volume in cm³. The sample of about 50 cm³ of powder, previously been passed through a standard sieve no. 20, was carefully introduced into a 100 ml graduated cylinder. The cylinder was dropped at 2-second intervals onto a hard wood surface three times from a height of 1 inch. The bulk density of each formulation was then obtained by dividing the weight of sample in grams by the final volume in cm³ of the sample contained in the cylinder.

It was calculated by using equation below:

$$D_f = M/V_p$$

Where,

D_f = bulk density

M = weight of samples in grams

V_p = final volumes of granules in cm

4. Tapped density:

The tapped density was obtained by dividing the mass of a powder by the tapped volume in cm³. The sample of about 50 cm³ of powder previously been passed through a standard sieve no. 20, is carefully introduced into a 100 ml graduated cylinder. The cylinder was dropped at 2-second intervals onto a hard wood surface 100 times from a height of 1 inch. The tapped density of each formulation was then obtained by dividing the weight of sample in grams by the final tapped volume in cm³ of the sample contained in the cylinder.

It was calculated by using equation given below:

$$D_o = M/V_p$$

Where,

D_o = bulk density

M = weight of samples in

V_p = final volumes of granules in cm

5.Carr's Index:

An indirect method of measuring powder flow from bulk densities was developed by Carr. The percentage compressibility of a powder was a direct measure of the potential powder arch or bridge strength and stability.

Carr's index of each formulation was calculated according to equation given below

% Compressibility =

Where,

Df = Fluff or Poured bulk or bulk density.

Do = Tapped or Consolidated bulk density

Carr's index (%)

Table 3: Carr's index

Carr's index (%)	Type of flow
5-1	Excellent
12-16	Good
18-21	Fair to passable
23-35	Poor
33-38	Very poor
>40	Extremely poor

6.Anti Urolithiatic activity:

Antiurolithiatic Activity by In Vitro Calcium Oxalate Crystal Inhibition Method:

Materials Required:

- Celosia argentea powder extract
- Calcium chloride (CaCl₂)
- Sodium oxalate (Na₂C₂O₄)
- Distilled water
- Tris buffer (pH 6.5)
- Hydrochloric acid (HCl)
- Test tubes
- Micropipettes
- Water bath (37°C)
- Light microscope
- Glass slides

Procedure

1. Prepare 5 mmol/L calcium chloride solution.
2. Prepare 7.5 mmol/L sodium oxalate solution.
3. Prepare different concentrations of the *Celosia argentea* extract (e.g., 100, 200, and 400 µg/mL).
4. Add the extract to the calcium chloride solution.
5. Add sodium oxalate solution and mix.
6. Incubate at 37°C for 30 minutes.
7. Place a drop of the mixture on a glass slide.
8. Observe calcium oxalate crystals under a microscope (10× or 40×).
9. Compare the number and size of crystals with the control.

Result:

1. Angle of repose (θ):

Table 4: Angle of repose as an indication of powder flow properties

Formulation	Angle of repose (degrees)	Type of flow
F1	35	Passable/fair flow
F2	30	Good flow
F3	27	Excellent flow

2) Bulk Density

It was calculated by using equation below:

$$D_f = M/V_p$$

Where,

D_f = bulk density

M = weight of samples in grams

V_p = final volumes of granules in cm

Table 4: Bulk density

Batch	Bulk density (g/ml)
F1	0.30
F2	0.40
F3	0.60

3.Tapped density

It was calculated by using equation given below:

$$D_o = M/V_p$$

Where,

D_o = bulk density

M = weight of samples in grams

V_p = final volumes of granules in cm

Table 5: Tapped Density

Batch	Tapped density (g/ml)
F1	0.4
F2	0.5
F3	0.7

4.Carr's Index:

Carr's index of each formulation was calculated according to equation given below:

$$\% \text{ Compressibility} = \frac{D_f - D_o}{D_f} \times 100$$

Where ,

D_f = Fluff or Poured bulk or bulk density.

Do = Tapped or Consolidated bulk density.

Table 6: Carr's index

Batch	Carr's index
F1	14.3%
F2	21%
F3	15%

5. Anti Urolithiatic activity:

Table 7: Anti Urolithiatic activity:

Sample	Concentration (µg/mL)	No. of Crystals	% Inhibition
Control	0	120	0
Test 1	100	95	20.8
Test 2	200	70	41.7
Test 3	400	40	66.7

The Celosia argentea powder extract showed dose-dependent inhibition of calcium oxalate crystal formation. Higher concentrations produced greater inhibition, indicating potential antiurolithiatic activity.

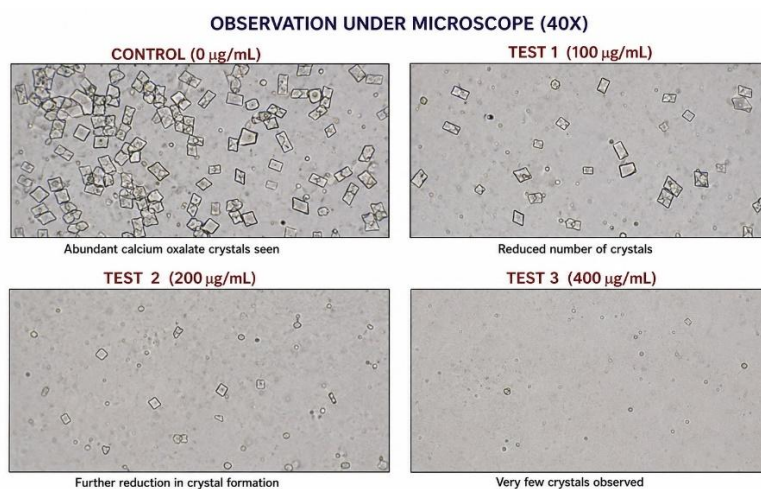


Fig 3: In Vitro Calcium Oxalate Crystal Inhibition Method

DISCUSSION AND CONCLUSION

Discussion:

The present study was carried out to formulate and evaluate herbal churna prepared from *Celosia argentea* seeds for the treatment of kidney stones. The herbal powder was prepared by cleaning, drying, pulverizing, sieving, and mixing the powdered material with suitable excipients such as sugar powder, talc, and aerosil. Pre-formulation studies showed that the powdered drug possessed acceptable organoleptic properties including characteristic color, odor, and taste. The powder was found to be free from foreign matter and suitable for further formulation. The prepared churna was evaluated for various physicochemical parameters such as bulk density, tapped density, angle of repose, Carr's index, Hausner ratio, moisture content, ash value, and particle size distribution. The results indicated satisfactory flow properties and good compressibility of the powder blend. The angle of repose and Hausner ratio values confirmed acceptable flow behavior of the herbal churna.

Conclusion:

The study concluded that the herbal churna prepared from *Celosia argentea* seeds was successfully formulated and evaluated. The prepared powder exhibited satisfactory physicochemical properties, acceptable flow characteristics, and good stability.

Phytochemical investigation confirmed the presence of bioactive constituents which may contribute to anti-urolithiatic activity useful in the treatment of kidney stones. Evaluation parameters such as angle of repose, bulk density, tapped density, Carr's index, Hausner ratio, moisture content, and ash value were found within acceptable pharmacopeial limits.

Reference:

1. Tang Y, Xin HL, Guo ML (2016). Review on research of the phytochemistry and pharmacological activities of *Celosia argentea*. *Revista Brasileira de Farmacognosia*. 26(6):787–796.
2. Patil SB, et al. (2012) Pharmacognostic and phytochemical evaluation of *Celosia argentea*. *Pharmacognosy Journal*.;4(33):7–15.
3. Tolouei SEL, et al. (2019). *Celosia argentea* L. (Amaranthaceae): An ethnopharmacological report. *Journal of Ethnopharmacology*.;229:115–126.
4. Sharma P, et al. (2025). Phytochemical profiling and antioxidant activity of *Celosia argentea*. *Chemistry & Biodiversity*;22(12):e01029.
5. Wu Q, Wang Y, Guo M. (2011). Triterpenoid saponins from seeds of *Celosia argentea*. *Chemical & Pharmaceutical Bulletin*.;59(5):666–671.
6. Rub RA, et al. (2016). Characterization of anticancer principles of *Celosia argentea*. *Pharmacognosy Research*. 8(2):97–104.
7. Sharma P, et al. (2026). Ethnopharmacological and phytochemical aspects of *Celosia argentea*. *Toxin Reviews*.
8. Hamzah RU, et al. (2026). Methanolic extract of *Celosia argentea* and its pharmacological effects. *Comparative Clinical Pathology*. 202;27:1065–1071.

9. Wu Q, Wang Y, Guo M. (2011). Triterpenoid saponins from the seeds of *Celosia argentea* and their anti-inflammatory and antitumor activities. *Chemical & Pharmaceutical Bulletin.*;59(5):666–671.
10. Ahamed SSN, Shekshavali T, Shafeeq R. (2018). *Celosia argentea*: A review. *Research Journal of Pharmacology and Pharmacodynamics.*;10(2):83–86.