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Research Paper

Formulation And Evaluation of Bryophyllum Pinnatum Leaves Syrup for Management of Kidney Stones

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ABSTRACT

The present study was aimed at the formulation and evaluation of a herbal syrup using leaves of Bryophyllum pinnatum for the management of kidney stones (urolithiasis). Kidney stones are a common urinary disorder caused by the crystallization of minerals in the renal system, leading to pain and other complications. In this study, the leaf extract of Bryophyllum pinnatum was prepared by the decoction method and incorporated into a syrup base containing sucrose, glycerin, citric acid, and sodium benzoate. Three different formulations (F1, F2, and F3) were prepared by varying the concentration of the extract and excipients. The prepared syrups were evaluated for organoleptic properties, pH, viscosity, solubility, and clarity. The results indicated that all formulations possessed acceptable physicochemical characteristics with pH ranging from 4.80 to 4.98 and good solubility and clarity. Among the formulations, F2 showed optimal results in terms of viscosity, taste, and overall acceptability. The study concludes that Bryophyllum pinnatum-based herbal syrup can be a promising, safe, and effective natural alternative for the management of kidney stones...

INTRODUCTION

Kidney stones, also called calculi, are hard deposits made of minerals that form in the parts of the kidney called the calyces and pelvis. These stones can be loose or stuck to the kidney's tiny tubes. When stones form in the urinary tract, this condition is called nephrolithiasis or urolithiasis. It happens when urine has too much of certain

minerals, which causes crystals to form, grow together, and stay in the kidneys. Around the world, about 80% of kidney stones are made of calcium oxalate mixed with calcium phosphate. Other types include uric acid stones, which make up about 9%, struvite stones at around 10%, and cystine stones, which are about 1%. Now, it's clear that kidney stones are a more complicated problem that needs careful evaluation and thorough

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treatment. Sometimes, urine can hold too much of certain drugs or chemicals, which can cause stones. For example, people with HIV who take protease inhibitors like indinavir may develop kidney stones. Kidney stones form due to a variety of reasons that involve both genetic factors and environmental influences. Some of these factors include age and family history, while others are related to weather, diet, and hydration levels. You may experience symptoms such as pain during urination, presence of blood in the urine, sudden and severe pain, nausea, vomiting, swelling in the hands or feet, a puffy face, an upset stomach, and difficulty in urinating. This study focuses on the formulation and evaluation of a herbal syrup made from the leaves of *Bryophyllum pinnatum*, which is known for its anti-urolithiatic properties. There has been considerable advancement in the medical and surgical treatment of kidney stone patients. Stones can be broken down using shockwave lithotripsy (SWL) to help them pass through urine, or they can be surgically removed through percutaneous nephrolithotomy (PCNL). The present study aims to develop and assess a new herbal syrup based on a sugar-based aqueous oral preparation, ensuring better patient compliance and improved taste. There's a good possibility that naturally available herbal sources are the best option and have no harmful effects. The plant *Bryophyllum pinnatum*, which has the natural ability to help remove kidney stones, is widely used as traditional medicine in countries like India, China, Australia, and Africa. It is used to treat various conditions such as body pain, arthritis, heartburn, skin ulcers, peptic ulcers, and others.[10]

Types of kidney stones:

1. Calcium Stones
2. struvite stones or magnesium ammonium phosphate stones
3. uric acid stones

4. cystine stones
5. drug- induced stones

This method serves as an instrument for controlling nutrition to prevent the formation of kidney stones. The most effective way to prevent urolithiasis is through the regulation of nutrition, hydration, and the prevention of kidney stone disease via dietary intervention.[6] Herbal syrup is a natural remedy created by infusing medicinal herbs into a sweet liquid base, typically honey or sugar syrup. It is commonly used to support health and wellness, offering relief for ailments such as coughs, sore throats, digestive issues, and immune support. Due to their pleasant taste and therapeutic benefits, herbal syrups are widely utilized in traditional medicine and holistic healing practices.[11] Syrups have been used for centuries in traditional medicine as a natural method to support overall well-being and address various health concerns. They combine the healing properties of herbs with the preservative and soothing effects of honey or sugar, making them both effective and palatable.[12]

Types of herbal syrup :

1. Flavored syrup[13]
2. medicated syrup[14]

Uses of syrup :

- *bryophyllum pinnatum* leaves syrup is used to help dissolve and remove kidney stones.
- it is used to treat urinary tract infections by reducing burning sensation during urination.
- it acts as a diuretic and increases urine output to flush out toxins.
- it is used for its anti-inflammatory effect to reduce swelling and pain.
- it helps in wound healing by promoting tissue repair and recovery.[15]

❖ MATERIAL :

Bryophyllum pinnatum :





Fig. No. 1 :Bryophyllum pinnatum

This method has traditionally been used in folk medicine to treat a wide range of ailments. Its juice, extracted from fresh leaves, has shown significant therapeutic potential, particularly in the management of kidney stones (urolithiasis). [16]
Biological source : It consists of the fresh or dried leaves of bryophyllum pinnatum belongs to family Crassulaceae.

Chemical constituents :

- Flavonoids: quercetin,
- Bufadienolides: Bryophyllin a, b (active compounds)
- Alkaloids
- Tannins
- Glycosides
- Steroids & Triterpenoids
- Organic acids

Pharmacological activities:

- Bryophyllum pinnatum exhibits anti-urolithiatic activity, helping in the prevention and treatment of kidney stones.
- It shows diuretic activity, increasing urine output and aiding in detoxification.
- The plant possesses anti-inflammatory properties, reducing swelling and pain.
- It has antimicrobial activity, effective against various bacteria and fungi.
- Bryophyllum pinnatum promotes wound healing by accelerating tissue repair.

- It exhibits hepatoprotective activity, protecting the liver from damage.
- The plant has antioxidant properties, helping to neutralize harmful free radicals.
- It shows antipyretic activity, helping to reduce fever.[17]

METHOD OF PREPARATION :

1. Preparation of leaf extract

Fresh leaves of Bryophyllum pinnatum were gathered and carefully washed with clean water to remove dirt, dust, and any sticking impurities. After washing, the leaves were dried in a shaded area using a hot air oven set at 121 Â°C for 40 minutes. Once fully dried, the leaves were ground into a coarse powder using a grinder. The resulting powder was then boiled with a specific amount of purified water for about 20 to 30 minutes to extract the water-soluble compounds. After boiling, the mixture was let to cool a bit and then filtered through Whatman filter paper to separate the plant material from the liquid extract.[18]



2. Preparation of syrup

This method involved dissolving a calculated amount of sucrose in purified water using gentle heating and continuous stirring to ensure uniform mixing and prevent burning. After slight cooling, excipients such as sodium benzoate and citric acid (previously dissolved in small amounts of water) were added with constant stirring, followed by the

gradual addition of glycerin to enhance solubility, viscosity, and taste. The concentrated extract of *Bryophyllum pinnatum* was then slowly incorporated with continuous stirring to ensure proper mixing. Finally, the volume was adjusted to



60 ml with purified water, filtered to remove impurities, and allowed to cool. The prepared syrup was then filled into clean, dry amber-colored glass bottles, sealed, labeled, and stored under suitable conditions for further evaluation.[16-19]



❖ FORMULATION TABLE:

Sr. No.	Ingredients	F1	F2	F3
1.	<i>Bryophyllum pinnatum</i> leaves extract	10 g	12 g	15 g
2.	Citric acid	0.2 g	0.3 g	0.4 g
3.	Sodium benzoate	0.1 g	0.1 g	0.1 g
4.	Glycerin	5 ml	7 ml	10 ml
5.	Sucrose	30 g	35 g	40 g
6.	Purified water	40 ml	40 ml	40 ml

❖ EVALUATION :

- Organoleptic properties** Organoleptic evaluation is a critical part of assessing the quality and user acceptance of syrup.
- Color** : The visual appeal of the syrup is assessed by its color. It should have a uniform and natural with no discoloration or cloudiness. The color typically reflects the natural extracts used, and any deviation from the expected shade may indicate issues such as improper preparation or adulteration.

- Odor** : The aroma of the syrup is evaluated to ensure it is pleasant and characteristic of the herbs used. A soothing, mild herbal fragrance is desirable, and an unpleasant or overpowering odor may indicate poor-quality ingredients
 - Taste** : Taste is one of the most important organoleptic parameters, especially for medicinal syrups. The syrup should have a balanced taste, sweet enough to mask any bitterness from the herbal ingredients, yet not overly sweet. A harsh or overly medicinal taste can discourage usage, especially in children.
- Clarity:**
Clarity is crucial for the aesthetic quality of the syrup, which should be free from sediment, cloudiness, or any visible particles. The syrup should also maintain uniformity, meaning no



separation of components occurs over time, ensuring a consistent product.



3. **pH measurement** : The pH of a syrup is a critical parameter, as it influences the solubility and stability of active ingredients. For syrup, the pH should be within an optimal range to prevent degradation of herbal compounds and to ensure the syrup is gentle on the mucous membranes. pH is typically measured using a digital pH meter or pH indicator paper. A typical herbal syrup may have a pH range of 4.5 to 6.5, depending on the type of herbs used and any added excipients.



4. Viscosity :

Viscosity is a measure of the syrup's thickness or resistance to flow. It affects the texture and mouthfeel of the syrup, influencing its ability to coat the throat and provide relief from coughing. Viscosity is typically measured using a viscometer or rheometer. The desired viscosity of the syrup should be sufficient to offer a smooth, thick consistency without being too runny or overly sticky. A proper

viscosity ensures ease of consumption and effective therapeutic action.



5. **Solubility** : Solubility refers to the ability of the syrup's components (such as herbal extracts, sugars, and other excipients) to dissolve in water or other solvents. It is essential for ensuring uniform distribution of active ingredients throughout the syrup. Solubility tests are usually performed by adding a known amount of syrup to water and observing the dissolution of the components. Good solubility ensures that the syrup can be easily administered and provides consistent therapeutic effects.[20]



RESULT

The formulated syrup of Bryophyllum pinnatum leaves for the management of kidney stones was successfully prepared using herbal ingredients and evaluated for its physicochemical properties across three formulations (F1, F2, and F3). All batches exhibited a light to dark brown color, with F1 and F2 having a pleasant, mild herbal odor,

while F3 showed a comparatively stronger herbal odor. The taste profile ranged from sweet with mild bitterness in F1, to sweet and acceptable in F2, and slightly more herbal in F3. The pH values were found to be within an acceptable acidic range (4.80, 4.88, and 4.98, respectively), indicating suitability for oral administration. Viscosity increased progressively from F1 (850 cp) to F3 (1050 cp), suggesting a thicker consistency in higher formulations. All batches demonstrated good solubility and were clear, free from any visible particles, confirming uniformity and stability of the prepared syrup.

DISCUSSION

The formulated syrup of *Bryophyllum pinnatum* demonstrated satisfactory physicochemical and organoleptic properties, indicating its suitability for use in the management of kidney stones. The gradual increase in viscosity from F1 to F3 suggests that variations in formulation composition influenced the thickness and consistency of the syrup, which can affect patient acceptability and dosing accuracy. The pH values of all batches were found to be within an acceptable acidic range, ensuring stability of the formulation and compatibility with oral administration without causing irritation. Organoleptic evaluation revealed that F2 exhibited the most balanced characteristics in terms of color, odor, and taste, making it more palatable compared to F1 and F3, where slight bitterness or stronger herbal odor was observed. Good solubility and clarity in all formulations indicate proper extraction and uniform distribution of phytoconstituents without precipitation or particulate matter. Overall, among the three batches, F2 can be considered the optimized formulation due to its acceptable viscosity, pleasant odor, and better taste profile, suggesting improved patient compliance and effectiveness.

CONCLUSION

In conclusion, the formulated syrup of *Bryophyllum pinnatum* leaves was successfully developed and evaluated for its potential use in the management of kidney stones. All three formulations (F1, F2, and F3) showed acceptable physicochemical and organoleptic properties, including suitable pH, good solubility, clarity, and stability. Among them, F2 was identified as the optimized formulation due to its balanced viscosity, pleasant odor, and better taste, which are important for patient acceptability and compliance. The study supports the potential of *Bryophyllum pinnatum* as an effective herbal ingredient in syrup formulation, providing a promising natural alternative for kidney stone management.

REFERENCES

1. Khan SR. Nephrocalcinosis in animal models with and without stones. *Urol Res.* 2010; 38:429–438. [PubMed: 20658131]
2. Finlayson B. Physicochemical aspects of urolithiasis. *Kidney Int.* 1978; 13:344–360. [PubMed: 351263]
3. Evan AP. Physiopathology and etiology of stone formation in the kidney and the urinary tract. *Pediatr Nephrol.* 2010; 25:831–841. [PubMed: 19198886]
4. Shastri S, Patel J, Sambandam KK, Lederer ED. Kidney stone pathophysiology, evaluation and management: Core Curriculum 2023. *Am J Kidney Dis.* 2023;82(5):617-634. Doi:10.1053/j.ajkd.2023.03.017.
5. Tattevin P, et al. Increased risk of renal stones in patients treated with atazanavir. *Clin Infect Dis.* 2013; 56:1186.
6. Allegri T, Petros B. Kidney Stone Disease: An Update on Current Concepts. *Advances in Urology.* 2018;2018:1–12. Doi:10.1155/2018/3068365.



7. Doddametukurke RB, Biyani CS, Browning AJ, Cartledge JJ. The role of urinary kidney stone inhibitors and promoters in the pathogenesis of calcium containing renal stones. *EAU-EBU Update Series*. 2007;5:126-36.
8. Romero V, Akpinar H, Assimos DG. Kidney stones: a global picture of prevalence, incidence, and associated risk factors. *Rev Urol*. 2010; 12:e86–e96. [PubMed: 20811557]
9. Apalkar KD, Mote AN, Pawar VH, Patil KS. Formulation and evaluation of poly herbal syrup. *Int J Res Appl Sci Eng Technol*. 2025;13(2). Doi:10.22214/ijraset.2025.67006
10. Ghasi S, Egwuib C, Achukwu PU, Onyeanusim JC. Assessment of the medical benefit in the folkloric use of *Bryophyllum pinnatum* leaf among the Igbos of Nigeria for the treatment of hypertension. *Afr J Pharm pharmacol*. 2011;5(1):83-92.
11. Shah B, Seth AK. *Textbook of Pharmacognosy and Phytochemistry*. 2nd ed. New Delhi: Elsevier; 2010.
12. Bone K, Mills S. *Principles and Practice of Phytotherapy: Modern Herbal Medicine*. 2nd ed. Edinburgh: Churchill Livingstone Elsevier; 2013.
13. Allen LV Jr. *Pharmaceutical Calculations*. 14th ed. Philadelphia: Wolters Kluwer; 2016.
14. Aulton ME, Taylor KMG. *Aulton's Pharmaceutics: The Design and Manufacture of Medicines*. 5th ed. Edinburgh: Elsevier; 2018. Shraddha Institute of Pharmacy, Washim 2025-26 Page no. 30 Formulation and evaluation of *bryophyllum pinnatum* leaves syrup for management of Kidney stone.
15. Kirtikar KR, Basu BD. *Indian Medicinal Plants*. 2nd ed. Dehradun: International Book Distributors; 2006.
16. Nayak BS, Marshall JR. The use of *Bryophyllum pinnatum* in traditional medicine: a review. *J Ethnopharmacol*. 2012;143(3):123–132.
17. Trease and Evans *Pharmacognosy* Evans WC. *Trease and Evans Pharmacognosy*. 16th ed. London: Saunders Elsevier; 2009.
18. Harborne JB. *Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis*. 3rd ed. London: Chapman and Hall; 1998.
19. Aulton ME, Taylor KMG. *Aulton's Pharmaceutics: The Design and Manufacture of Medicines*. 5th ed. Edinburgh: Elsevier; 2018.
20. Sinko PJ. *Martin's Physical Pharmacy and Pharmaceutical Sciences*. 6th ed. Philadelphia: Lippincott Williams & Wilkins; 2011.

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