2026 Volume: 02 Issue: 06 www.ijrpa.com ISSN 2456-9995 Review Article

International Journal Research Publication Analysis

Page: 01-11

FORMULATION AND EVALUATION OF HERBAL ANTIUROLITHIATIC SYRUP

[*1]Makhanlal Sen, [2]Dr. N. S. Lodhi, [3]Dr. Nilesh Jain, [4]Dr. R. B. Goswami

[1]Student, Sagar institute of Research Technology & Science- Pharmacy, Bhopal.

[2]Assistant Professor, Sagar institute of Research Technology & Science-Pharmacy, Bhopal.

[3]Vice Principle, Sagar institute of Research Technology & Science-Pharmacy, Bhopal.

[4]Director, Sagar institute of Research Technology & Science- Pharmacy, Bhopal.

Article Received: 30 April 2026
Article Revised: 20 May 2026
Published on: 10 June 2026

***Corresponding Author: Makhanlal Sen**
Student, Sagar institute of Research Technology & Science- Pharmacy, Bhopal.

DOI: https://doi-doi.org/101555/ijrpa.1475

ABSTRACT

Urolithiasis, commonly known as kidney stone disease, is a prevalent urinary disorder characterized by the formation of calculi in the urinary tract due to supersaturationofurinewithstone-formingconstituentssuchascalciumoxalate, uric acid, and phosphate. Conventional therapies, including surgical and lithotripsy methods, are often associated with side effects, recurrence, and high costs, creating a need for safer and more effective herbal alternatives.

The present research project aims to **formulate and evaluate a herbal antiurolithiaticsyrup**usingplantextractstraditionallyknownfortheirlithotriptic, diuretic, and antioxidant properties. Selected herbal ingredients such as Bryophyllum pinnatum were incorporated into a palatable syrup base. The formulation was subjected to various **physicochemical evaluations**, including pH, viscosity, specific gravity, stability, and organoleptic properties.

Further, **in vitro antiurolithiatic activity** was assessed using calcium oxalate crystal inhibition and dissolution models to evaluate the formulation's efficacy in preventing crystal nucleation and aggregation. The results demonstrated significantinhibitionofcalciumoxalatecrystallizationcomparedwiththestandard drug (cystone), indicating potential antiurolithiatic activity.

The study concludes that the developed polyherbal syrup possesses promising antiurolithiatic

potential, offering a natural, safe, and effective alternative to existing synthetic therapies. Future work will focus on **in vivo evaluation and clinicalvalidation**toconfirmtherapeuticefficacyandsafetyinhumansubjects

INTRODUCTION

Bryophyllumpinnatum.Linn(family:crassularaceae)isoneofthemostimportant medicinal plant. Bryophyllum pinnatum.linn plant commonly known as love plant, miracle leaf, life plant…etc .In Nigeria this plant is locally called as "Never Die" plant and one of the popular plants in folklore medicine. This plant is widely used by traditional practitioners for hypertension, skin disorders, asthma, cold, insect stings, and abscesses. In Ayurvedic science it is commonly known as Parnabeeja. These are also used in bleeding disorder, ulcer, and diarrhoea. The main chemical constituents of this plant include alkaloids, flavonoids, glycosides, steroids, bufadienolides, and organic acid etc. It is a perennial herb which is about 1m tall. Stem is fleshy and cylindrical and youngest stem are reddish in colour. It is growing primarily in rain forests and distributed worldwide. It is astringent and sour in taste. The nutritive value of fresh and dried leaves of Bryophyllum pinnatum shows that the carbohydrate values were the highest and ash had the least value. Calcium and potassium levels are high and lead and zinc levels are law in both fresh and dried samples. Presence of large amount of various chemical constituents in the plant Bryophyllum pinnatum shows various pharmacologicalactions.SothisplantBryophyllumpinnatumcanbeusedforthe treatment of various disease conditions. The leaves of Bryophyllum pinnatum show various pharmacological activities such

as anti-diabetic, anti-inflammatory, anti-nociceptive, anti-hypertensive, neuroprotective etc. The leaves of Bryophyllum pinnatum are fleshy simple or compound in nature. Flowers are bellshaped, drooping and are arranged in branchedclustersatthetipsofthestem.Thefruitsoftheplantarepaperyand membranous with four slender compartments. In this review some of the pharmacological activities of Bryophyllum pinnatum are mentioned.

- **Plant Profile**

Kingdom: Plantae – Plants Subkingdom:Tracheobionta Division : Spermatophyta Subdivision: Magnoliophyta Class : Magnoliopsida Subclass : Rosidae

Order : Rosales Family:Crassulaceae

Genus:Bryophyllum

Species:Bryophyllumpinnatumkurz

- **Synonyms**

Hindi:JakhMeHayat,Panfuti Sanskrit : Parnabija
Bengali : Koppata Gujarati:Ghaymaari Telgu : Simahmudu Tamil : Ranakalli
Malayalam:Ellamurunga

- **Morphology**

Bryophyllumpinnatumisasucculentglabrousherbwithaheightof 0.3-1.2m.

- **Stem**

TheyoungerstemsofBryophyllumpinnatumarereddishspeckledwith white and older one are lightcoloured,thestemsareobtuselyfourangled.Thestemsareupright, fleshy, and hairless.

- **Leaves**

Lower leaves are simple or compound in nature and the upper leaves are3-5/7foliolatewithlongpetioled.Thepetiolesareunitedbyaridge around the stem. The leaflets are ovate or elliptic with crenate or serrate margin. The leaves are green and yellowish-green in colour, The flowers are borneonastalk,about10-25mmlong.Theplantletsareproduced mainly when the leaves become detached from the stem.

- **Flower**

Theflowersarependentinlargespreadingpanicleswithopposite stout branches, pedicles are slender.Flowersaremainlybell-shaped,droopingandarearrangedin branched clusters at the tipofthestem.Theflowersareyellowishgreenorpalegreencoloured prominent sepals. Flowersaremainlyproducedduringwinterandspring.

- **Chemical Constituents**

TheplantBryophyllumpinnatumshowsvariouspharmacologicalactivities. The chemical constituents present in the various parts of the plant are responsible for these activities shown by the plant. The major chemical constituents present in the plant are, Isocitric acid & citric acid.

BufadienolideslikebryotoxinA,B,C

Phenols,PhenylpropanoidsandFlavanoids:Syringicacid,caffeicacid, 4-hydroxy-3- methoxy-cinnamic acid, 4-hydroxybenzoic acid,

p-hydroxycinnamicacid,paracoumaricacid,ferulicacid,protocatechuic acid,

phosphoenolpyruvate, protocatechuic acid

TriterpenoidsandSteroids:α-amyrin,α-amyrinacetate,β-amyrin, β-amyrinacetate, bryophollenone,bryophollone,taraxerol,pseudotaraxasterol, 18-α-oleanane, friedelin, glutinol.

Studyonphytochemicalconstituentspresentintheethanolextractofthe leaves of BryophyllumpinnatumonGC-MSanalysisshowsthepresenceof compounds like, butyrolactone,3,4-Epoxytetrahydrothiophene-,1,1-dioxide,1-Octen-3ol, Benzaldehyde, Oleic acid, Octadecanoic acid, n-Hexadecanoic acid.
Study of Bryophyllum pinnatum stem shows the presence of active constituentsalkaloids,flavonoids,saponin,Tannin,phytate,phenol, calcium, magnesium, phosphorous, sodium,and potassium.

Neuroprotectiveactivity

The aqueous leaf extract of Bryophyllum pinnatum shows neuropharmacological activities in mice. The extract was found to produce aprofounddecreaseinexploratoryactivityindosedependentmanner.The Bryophyllum pinnatum extract also showed a marked sedative effect as evidenced by a significant reduction in gross behaviour and potentiation of pentobarbitoneinduced sleeping time. It also delayed the convulsion (seizure)inducedbystrychnineandpicrotoxin.Italsodecreasestherateof mortality induced by picrotoxin in mice with LD50 of 641mg/kg.AllthesestudiesshowthattheBryophyllumpinnatum possesses depressant action on CNS28.

Urolithiatic activity

Bryophyllum has demonstrated anti-urolithiatic activity by preventing and reducing kidney stone formation.This effect is attributed to its ability to dissolvecrystals,inhibittheirformation,andpreventrenaldamage.Studies show that Bryophyllum pinnatum extracts can suppress the buildup of calciumoxalateandotherstone-formingsubstanceswhileincreasingstone inhibitors

EXTRACTION

MATERIALS AND METHODS

- **Drugsandchemicals**

Ethylene glycol (Qualigens Fine Chemicals, Mumbai), Cystone (The Himalaya Drug Company, Bangalore), creatinine estimation kit (Merck Specialities Pvt. Ltd., Mumbai),urea,uricacid,calcium,phosphorousestimation kit (ERBA diagnostics Mannheim, GmbH, Germany) and magnesium estimation kit (Lab-Care Diagnostics (India) Pvt.Ltd.,Valsad)wereprocuredfromlocalmarket.All otherchemicalsusedintheexperimentwereofthehighestgrade commercially available.

- **Preparationoftheextracts**

About 500 g of fresh leaves were soaked separately in ethanolandwater:Ethanol(30:70)inastoppercontainer for 3 days (maceration) with frequent agitation. The solutions were filtered to obtain alcoholic extract (AlcE) and hydro-alcoholic extract (HAlcE), respectively. The extracts were dried in a rotary evaporator and stored in desiccators for further use.

- **Preliminaryandquantitativeestimationof phytoconstituents**

AlcE and HAlcE were screened for the presence of carbohydrates,proteins,phenols,flavonoids,saponins, glycosides, alkaloids, terpenoids and, steroids using standard procedures. The total phenolic content of the extracts was determined spectrometrically by Folin–Ciocalteu method and expressed as percentage ofgallicacidequivalent.Thetotalflavonoidcontentwas determined by aluminium chloride colorimetric assay andexpressedaspercentageofrutinequivalentinextracts.Totalsaponins weredeterminedaccordingtopreviouslydescribedmethodofObadoniand Ochuko and expressed as percentage of saponins in extracts.

FORMULATION

Formula Table:

S.no	Ingredients	Quantity
1	BryophyllumExtract	25ml
2	Sucrose	89 gm
3	DistilledWaterer	100ml

Method of preparation for her balsyrup

Herbalsyrupispreparedbyusingthefollowingsteps

Step1:Methodofpreparationofdecoction

Theinitialstageinstudyingmedicinalplantisthepreparationofplantsamplesto preserve the biomolecules in the plants prior to extraction. Plants samples such as leaves, barks, roots, fruits and flowers can be extracted from fresh or dried plant materials such as grinding and drying also influences the preservation of phytochemicals in the final extracts.

A. ExtractionofBryophyllumpinnatum:

About 500 g of fresh leaves were soaked separately in ethanol and water:Ethanol (30:70) in a stopper container for 3 days (maceration) with frequent agitation. The solutions were filtered to obtain alcoholic extract (AlcE)andhydro-alcoholicextract(HAlcE),respectively.Theextractswere dried in a rotary evaporator and stored in

desiccatorsforfurtheruse.

B. Filtration:

- Coolslightlyandfilterthroughamuslinclothorfinesievetoremove plant material.
- Collecttheclearherbalextract

Step 2: Method of preparation of herbal syrup

A. SyrupBasePreparation:

- Inaseparatepan,addsugartoanequalvolumeofthefiltered extract (usually 1:1).
- Heatgentlywithconstantstirringuntilthesugarcompletelydissolves.
- Donotoverheat(avoidcaramelization)

B. Concentration

- Continueheatinguntilthesyrupattainsaslightlythickconsistency (usually around 60–65 °Brix if using a hydrometer).

C. CoolingandAdditives:

- Allowtocoolbelow40°CbeforeaddingExtractoranyheat-sensitive ingredients (like lemon juice or essential oils).
- Ifusingapreservative,dissolveandaddatthisstage.

D. Bottling:

- Pourthesyrupintosterilizedglassbottleswhilestillwarm.
- Sealtightlyandlabelwithname,date,anddosage.

E. Storage:

- Storeinacool,dryplaceawayfromdirectsunlight.
- Shelflifeistypically3–6months(longerifrefrigeratedorpreserved).

EVALUATION

PHYSICALEVALUATION

1. Colourexamination:Fivemlfinalsyrupwastakenintowatch Glassand placedagainstwhitebackgroundinwhitetubelight.Itwasobservedforits colour by naked eye.

2. Odourexamination:Twomloffinalsyrupwassmelledindividually.Thetime interval among two smelling was kept 2 minutes to nullify the effect of previous smelling.

3. Testexamination:Apinchoffinalsyrupwastakenandexaminedforitstaste ontastebudsofthetongue.Orsimplyapinchofsyrupwasputontipofftongue for determining test.

OBSERVATION TABLE

S.no	Physical Parameter	Result
1	Color	Colourless
2	Odour	Pleasant
3	Taste	Sweetish

PHYSICOCHEMICALPARAMETER

1. DeterminationofpH

Placed an accurately measured amount 10 ml of the final syrup in a 100 ml volumetric flask and made up the volume up to 100 ml with distilled water. The solutionwassonicatedforabout10minutes.pHwasmeasuredwiththehelpof digital pH meter.

2. Determiningofviscosityofsyrup

Theviscosityofthesyrupwasdeterminedbyusingviscometermainlycapillary viscometer, the average viscosity of any syrup at 21-30°c temperature is 700-1300centipoiseorcp,thedeterminedviscosityofsyrupwas880cp.

3. Determinationofdensity

The density of syrup can be determined by using the specific gravity of bottle. Cleanthespecificgravitybottlethoroughlywithchromicacidornitricacid.With the distilled water rinse the bottle for two to three times. Note the weight of the empty dry bottle with the capillary tube stopper (w1). Now fill the bottle with an unknown liquid and place the stopper and wipe of the excess liquid outside the bottle with the unknown liquid in analytical balance (w2). Finally, calculate the weight in grams of unknown liquid.

4. Visualinspection

The visual inspection, the ingredient & the final product are carefully examined for purity &for appearance Physical appearance of the product for patient adherencecomplianceiscriticalsothatitshouldbegoodlooking&elegancein appearance.

OBSERVATIONTABLE

S.no	Parameter	Result
1	PH	6.46
2	Viscosity	0.27Poise
3	Density	14.2gm
4	VisualInspection	GoodLooking

CONCLUSION

- The project's conclusion is that the developed polyherbal syrup, formulated with plant extracts traditionally known for their therapeutic properties,showspromisingantiurolithiaticpotential.Thissyrupoffers anatural,safe,andeffectivealternativetoexistingsynthetictherapies for urolithiasis (kidney stone disease).
- Urolithiasis is a prevalent urinary disorder. Conventional therapies (surgical,lithotripsy)oftencausesideeffects,recurrence,andhigh costs, creating a need for safer herbal alternatives.
- Theherbalantiurolithiaticsyrupwasformulatedusingselectedplant extracts, including Bryophyllum pinnatum, chosen for its lithotriptic, diuretic, and antioxidant properties.
- Theformulationwasevaluatedforinvitroantiurolithiaticactivityusing calcium oxalate crystal inhibition and dissolution models.
- Theresultsshowedsignificantinhibitionofcalciumoxalate crystallization.
- Thisinhibitionwasobservedwhencomparedwiththestandarddrug, cystone, indicating potential antiurolithiatic activity
- Thedevelopedsyrupwassubjectedtovariousphysicochemicaland organoleptic evaluations.
- PhysicalParameters:ItwasfoundtobeColourless,haveaPleasant odour, and a Sweetish taste.
- Physicochemical Parameters: The measured pH was 6.46, the Viscositywas0.27Poise,andtheDensitywas14.2textgm.The visual inspection was Good Looking.
- Thestudyconcludesthatthesyruphaspromisingpotential.Future work will focus on:
- Invivoevaluation.Clinicalvalidationtoconfirmitstherapeuticefficacy and safety in human subjects.

REFERENCE

1. Aprioku JS. Effects of Aqueous Bryophyllum pinnatum Leaf Extract on HaematologicalRenalandSpermIndicesinWistarRats.IndianJPharm Sci. 2017;6.
2. Prasad AK, Kumar S, Iyer SV, Sudani RJ, Vaidya SK. PharmacognosticalPhytochemicalandPharmacologicalReviewon Bryophyllum pinnata. 2010;3:11.
3. OjewoleJAO.Antinociceptive,anti-inflammatoryandantidiabeticeffects of Bryophyllum pinnatum (Crassulaceae) leaf aqueous extract. J Ethnopharmacol. 2005 May;99(1):13–9.
4. NagaratnaA,PrakashLHegde.Acomprehensivereviewon parnabeeja(Bryophyllumpinnatum(lam.)Oken).2015Aug29;6.
5. JunYU,YasuhiroT,BanskotaAH,TranQL,TranQK,YukoH,IkuoS, Shigetoshi K. Antiproliferative activity of Vietnamese Medicinal plants. Biological and Pharmaceutical Bulletin 2002;25(6):753-760.
6. AfzalM,KazmiI,KhanR,SinghR,ChauhanM,BishtT,etal.Review Article Bryophyllum pinnatum: A review. :7. htts://keyserver.lucidcentral.org/weeds/data/media/Html/bryophyllum_pin natum.htm
7. Kamboj Anjoo, Saluja Ajay Kumar. Microscopical and Preliminary PhytochemicalStudiesonAerialPart(LeavesandStem)ofBryophyllum Pinnatum Kurz. PHCOGJ.2010;2(9):254-59.
8. MoeOW.Kidneystones:Pathophysiologyandmedical management. Lancet 2006;367:333-44.
9. TiseliusHG.Epidemiologyandmedicalmanagementofstonedisease. BJU Int 2003;91:758-67.
10. FleischH.Inhibitorsandpromotersofstoneformation.KidneyInt 1978;13:361-71.
11. JethiRK.Urolithiasisinman.Probe1982;21:277-80.
12. PrienEL,PrienELJr.Compositionandstructureofurinarystone.AmJ Med 1968;45:654-72.
13. AlessandraCP,ElvinoJG.Dietarycalciumintakeamongpatientswith urinary calculi. Nutr Res 2003;23:1651-60.
14. ObligadoSH,GoldfarbDS.Theassociationofnephrolithiasiswith hypertensionandobesity:Areview.AmJHypertens2008;21:257-64.
15. TomboliniP,RuoppoloM,BellorofonteC,ZaatarC, FolliniM.Lithotripsyinthetreatmentofurinarylithiasis. J Nephrol 2000;13 Suppl 3:S71-82.
16. Girach RD, Khan H, Ahmad M. Botanical identification of Thuhar seldomusedasUnanimedicine.HamdardMedicus(Pakistan),2003;46(1).

17. 2.HoareauL,DaSilvaEJ.Medicinalplants:are-emerginghealthaid. Electronic Journal of biotechnology, 1999; 2(2): 3-4.
18. Rai PD, Rajput SJ. Biological evaluation of polyherbalayurvediccardiotonic preparation-Mahamrutyunjaya rasa. Evidence-BasedComplementaryandAlternativeMedicine,2010;2011.
19. OancăME,AzoicăiD,ManoleA,IvanA.Contributionsatclinical epidemiologicalpeculiaritiesofessentialarterialhypertensionknowledgein a geographical area from Moldavia, Romania. Rev Med ChirSoc Med Nat Iasi, 2007;111(4): 1012-6.
20. Ubale, Rohit. "Formulation and evaluation of herbal cough syrup by usingnaturalingredients."InternationalResearchJournalofModernization in Engineering Technology and Science 6.1 (2024): 1648 1659.
21. Kotmire,Shreeyash."Theadvancesinpolyherbalformulation."Journal of Pharmacognosy and Phytochemistry 13.1 (2024): 210-221.
22. Mule,GeetanjliT."FormulationandIn-vitroEvaluationofPoly-herbal CoughSyrup."InternationalJournalofResearchinPharmacyandAllied Science 2.6 (2023)
23. Dnyaneshwar,KK."Formulationandevaluationofpolyherbalcough syrup." International Research Journal of Modernization in Engineering Technology and Science 5.4 (2023): 3170-3179.
24. Chavan, Dhiraj, and Tanisha Kale. "REVIEW ON POLY HERBAL COUGHSYRUPWITHPHARMACOLOGICALACTIVITY."International
25. ResearchJournalofModernizationinEngineeringTechnologyandScience 5.11(2023):9-15.