



A Review Article On Potential Uses And Pharmacological Activity Of Bryophyllum Pinnatum

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ABSTRACT :

Bryophyllum pinnatum, a medicinal plant found in tropical regions, contains alkaloids, flavonoids, and other bioactive compounds. It is used in traditional medicine for wound healing, hemostasis, and various therapeutic applications, including anti-inflammatory, anticancer, antidiabetic, hepatoprotective, and neuroprotective effects. This review highlights its chemical composition and medicinal benefits.

KEYWORDS :

Scientific Classification, Macroscopical Character, Microscopical Character, Chemical Constituents, Potential Uses Of Bryophyllum Pinnatum, Pharmacological Activity, Nutritional Value Of Bryophyllum Pinnatum, Side Effects, Marketed Formulations.

INTRODUCTION :

Around the world, kidney stones, also known as urolithiasis, are common in people between the ages of 20 and 30. Men are more likely than women to develop kidney stones, but kidney stones can also occur in young children as early as age 5, with the main causes being dehydration and a diet high in ultra-processed foods. to emphasise the benefits of Kalanchoe pinnate as a natural kidney stone treatment. There are 30 species of Patharchatta.

Kalanchoe, or patharchatta, is a perennial succulent plant that is commonly

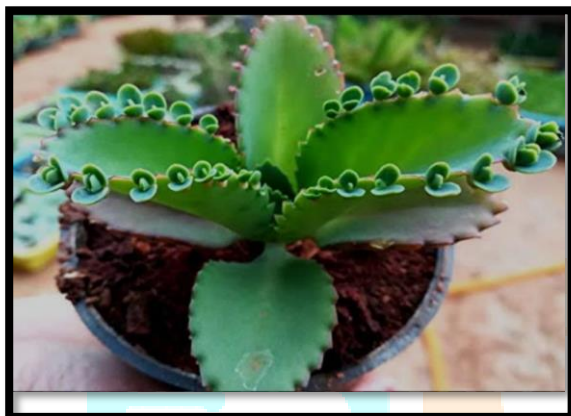
cultivated in India. Its long, hollow stems have earned it the nickname "air plant" in common parlance. Kalanchoe features dark green, thick leaves and pendulous, bell-shaped blooms. Temperate climates in Asia, the West Indies, Australia, New Zealand, and other places are ideal for growing patharchatta. Bryophyllum pinnatum is the plant's scientific name, and it is a member of the leguminosae family. Pashanabheda is the Sanskrit name for Patharchatta. It goes by several names, including miraculous leaf, air plant, cathedral bells, and Wonder of the World. A variety of therapeutic nutrients are known to be present in the medicinal plant patharchatta. Let's examine a few of patharchatta health advantages. [1,2]

SCIENTIFIC CLASSIFICATION

- Kingdom: Plantae
- Subkingdom : Tracheobionta
- Clade : Tracheophytes
- Division : Spermatophyte
- Subdivision : Magnoliophyta
- Class : Mangnoliopsida
- Subclass : Rosidae
- Order : Saxifragales
- Family : Leguminosae [3]

MACROSCOPICAL CHARACTER :

Its height ranges from 1 to 1.5 metres, and its hollow, four-angled stem is typically branched. The leaves are 10–20 cm long and oriented oppositely. The simple leaves are found at the bottom, but the top three, which are long-petiole and foliate. The foliage is equipped with vegetative buds that can root. Terminal inflorescences panic 10–40 cm. Most flowers are bell-shaped pendulous. Tubular calyx, 2-4 cm; reddish-purple corolla, 5 cm, base lobes ovate lanceolate, sparingly ciliate, and basally inserted



stamens on the corolla; the oblong nectar scales; the calyx and corolla tube. The fruit pod has several septa and four smooth, striate seeds inside an elliptical shape.[4]

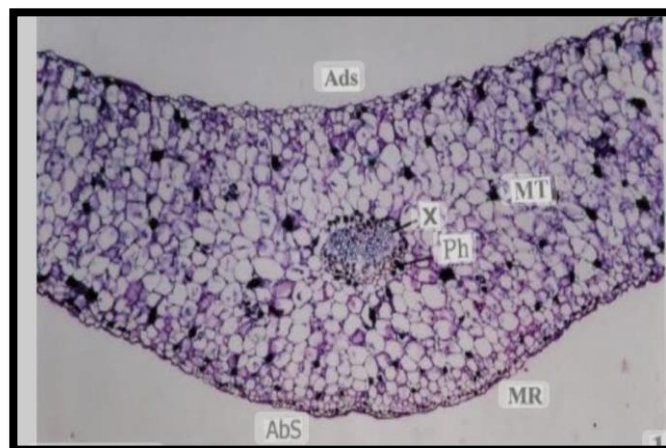
[6]

Fig.01 Bryophyllum Pinnatum MICROSCOPICAL CHARACTER :

1. The microscopic characteristics reveal the presence of a convex surface on the adaxial side and a thin layer on the abxial side. Its adaxial epidermal layer is thin and composed of tiny, barely noticeable cells. The midrib's ground tissue is parenchymatous. The cells are compact, angular, and round.



2. The vascular strand is hemispherical in form, solitary, and tiny. It is made up of a broad band of phloem and a thick horizontal band of xylem.[5]



Ads-Adaxial side, X- Xylem, Ph- Phloem, MT- Mesophyll tissue, MR-Midrib, AbS-baxial side
Fig. 02 Microscopical section of Bryophyllum pinnatum

CHEMICAL CONSTITUENT :

Alkaloids, flavonoids, tannins, phenolic compounds, saponin glycoside⁵, macroelements including calcium, magnesium, potassium, sodium, and phosphorus, and microelements like iron, zinc, vitamin, ascorbic acid, riboflavin, thiamin, and niacin are all present in the plant. Additionally, it contains ferulic acid, protocatechuic acid, phosphoenolpyruvate, parahydroxy cinnamic acid, para coumaric acid, syringic acid, caffeic acid, 4-hydroxy -3-methoxy cinnamic acid, and 4-hydroxy benzoic acid. Protocatechuic astragalin, luteolin, rutin, kaemferol, quercetin, and kaemferol-o-glycosides are also present in the plant's leaves. Six Three flavonoids with antileishmanial properties were extracted from the plant. Moreover, it contains bufadienolides such bryophyllin A, B, and C. Bryophyllon^[6]

CHEMICAL PROPERTIES :

1. Active Constituents: Contains various bioactive compounds, including alkaloids, flavonoids, tannins, and saponins.
2. Flavonoids: These compounds contribute to the plant's antioxidant properties.
3. Alkaloids: Certain alkaloids in the plant may have medicinal effects^[8]

BENEFIT OF BRYOPHYLLUM PINNATUM :

1. The leaves of Bryophyllum pinnatum plant have been reported to possess antileishmanial anticancer, Immunosuppressive, anti-ulcer, anti-inflammatory and anthelmintic, antihistaminic, antifungal, analgesic antihypertensive, antidiabetic and antimutagenic activities.
2. It has insecticidal, antibacterial, and central nervous system depressant properties.
3. According to research, the plant's hepatoprotective properties include the use of leaf juice in the treatment of jaundice.
4. It is also used for the treatment of kidney stones in India.
5. The herb was used to treat menstrual issues as well as uterine contractions^[9]

POTENTIAL USES OF BRYOPHYLLUM PINATTUM FOR OVRALL HEALTH :

Some of the potential uses of bryophyllum pinnatum are:

- **Potential use of bryophyllum pinnatum to reduce pain and inflammation:**
According to a 2013 study by Matthew et al. on albino rats, patharchatta may have analgesic and anti-inflammatory properties. The outcome implied that patharchatta stem extract might lessen inflammation and pain.⁴ To find out if patharchatta can help reduce pain and inflammation, more research is needed. Consequently, if you feel pain for an extended length of time or suspect inflammation, you should see a doctor.^[10]
- **Potential use of Bryophyllum pinnatum for kidney stone:**
According to a 2015 study by Phatak et al., patharchatta may be used to help the body get rid of kidney stones. Crystals of calcium oxalate are what form kidney stones. The calcium oxalate crystals may dissolve due to the patharchatta plant's saponins.⁵ Larger-scale research is still needed to determine whether patharchatta is helpful in kidney stone cases. Consequently, if you think you may have

a kidney stone, you need to see your doctor right away.^[11,12]

- **Potential use of bryophyllum pinnatum for microbial infection:**

According to a 2022 study by Tajudin et al., patharchatta may possess antimicrobial qualities. Patharchatta phenolic compounds have the potential to break down the bacterial wall and lessen the amount of harmful substances that the bacteria secrete. Typhoid and bacterial respiratory tract infections might benefit from patharchatta.⁷ To determine whether patharchatta could be helpful for infections brought on by microbes, more research is necessary. As a result, if you think you may have a microbial infection, you should see your doctor.^[13]

- **Potential use of bryophyllum pinnatum for stomach ulcer:**

Excess acid secretion is one of the causes of stomach ulcers. Molecules known as inflammatory cytokines are responsible for ulcer site inflammation. According to a 2018 Araujo study, patharchatta may be used to treat stomach ulcers. Patharchatta contains flavonoids that, by preventing the release of inflammatory cytokines and lowering excessive acid secretion, may lessen inflammation at the site of ulcers.⁸ Nevertheless, more research on humans is needed to determine whether patharchatta can help with stomach ulcers. Therefore, if you think you might have ulcers, you should see a doctor right away.^[14,15]

- **Potential use of bryophyllum pinnatum for cancer:**

Supertman et al.'s 2001 study suggested that patharchatta may have anticancer properties because of bioactive substances called bufadienolides. According to a different study conducted in 2022 by Ueda et al., patharchatta extracts may prevent the growth of cancerous cells. To determine whether patharchatta may be helpful for cancer, more research is needed. Therefore, rather than self-medicating if you suspect cancer, you should see a doctor right away.^[16,17]

PHARMACOLOGICAL ACTIVITY:**1. Anticancer activity:**

B. pinnatum yielded a substance called bryophyllin (Bufadienolides), which exhibits anticancer action against cancer cells. *pinnata* leaves that can be further exploited as a potential anticancer, anti-HPV therapeutic for treatment of HPV infection and cervical cancer.

2. Hepatoprotective activity:

For both in vivo and invitro histopathological studies using rats administered orally, the aqueous extract (also known as leaf juice) shown more efficacy than the ethanol extract of *B. pinnatum*'s ethanol extract shown hepatoprotective properties.

3. Nephrotoxicity activity:

Gentamicin-induced nephrotoxicity in rats was used to investigate the nephroprotective effect. This activity was caused by the oxidative free radical scavenging and antioxidant properties. In contrast to a conventional compound, *B. pinnatum* extract was also used to treat kidney stones.

4. Antihypertensive activity:

Records from Trinidad and Tobago show that *B. pinnatum* was used to treat hypertension of various kinds, including yours as in Western Nigeria.^[18]

5. Antiulcer activity:

The methanolic extract of leaves with antiulcer action was examined by Pal et al. Aspirin, ethanol, indomethacin, and stress-induced gastric ulcer in rats all have gastro protective effects. The pylorus-ligated rat ulcer generated by aspirin exhibits strong gastro protective action. The healing of the stomach ulcer caused by acetic acid is produced by the methanolic extract. The primary active ingredient causing these effects was flavonoids, which also induce the free radical scavenging action. Stop the cell damage.^[19]

6. Anti – inflammatory activity :

Using formaldehyde-induced hind paw in rats, indomethacin was used as the standard medication, and the pet ether, chloroform, methanol, extract, as well as isolated fraction such as flavonoid, alkaloid, and phenolic acid fraction of leaves extract, were given orally once a day for a period of two days. Compared to a normal medication, the methanolic extract of leaves significantly inhibits the oedema caused by formaldehyde.^[20]

NUTRITIONAL VALUE OF BRYOPHYLLUM PINNATUM :

Bioactive substances such as alkaloids, flavonoids, glycosides, triterpenes, cardinalities, bufadienolides, lipids, and steroids may be abundant in patharchatta. Furthermore, a desiccated patharchatta sample could comprise the subsequent nutrients. [21]

Nutritional Component	Value (in %)
Fats and oils	1.28
Fibre	6.02
Protein	5.38
Carbohydrate	72.92
Iron	0.18
Copper	0.03
Zinc	0.26
Potassium	3.49
Nickel	0.08
Calcium	4.99
Sodium	0.32
Lead	0.03
Cadmium	0.23

SIDE EFFECTS OF BRYOPHYLLUM PINATTUM :

While eating *Bryophyllum Pinnatum* has advantages, there are drawbacks as well. In general, *bryophyllum pinnatum* is safe to consume. On the other hand, exceeding the recommended dosage may cause the following adverse effects:

- 1) Stomach pain

- 2) Heartburn
- 3) Nausea
- 4) Diarrhoea with sour belching and vomiting issue [9]

MARKETED FORMULATIONS OF BRYOPHYLLUM PINATTUM :

Ingredients :

- pashanbhed (help to removal of kidney stone)
- Varun chhal (diuretic herb)
- Gokharu (relives urinary irritation)
- Brahmi (antioxidant properties)
- Harad (helpful in treating UTI)
- Baheda (helps maintaining renal health)
- Adulsa (cleaning properties)
- Kutaki (helpful in treating renal disorder)



Ingredients :

- shilajit: (used for dextoxifying the kidney)
- Chhota gokharu: (its given with honey in kidney stone)
- Punarnava: (the dieuretic properties eliminates excessive fluid And heips in detoxification)
- Pashanbhed : (inhibit the growth of calcium oxalate monohydrate Crystals



which is responsible for the formation of Kidney or urinary stones)

- Apamarg: (remedy for kidney stone and remedy for kidney stone And urinary tract)
- Charila : (stone flower and pathar phool used in kidney stone



Therapeutic uses:

Renal calculi, burning micturition, This is a Urinary antiseptic

Reference:

Patent & Proprietary Dosage: 2 tablespoonful thrice a day or as directed by physician.

Ingredients :

- Extracts of Arjun (Terminalia Arjuna) Bk 170 mg
- Lehsun (Allium Sativum) Bb 40 mg
- Dalchini (Cinnamomum verum) St.Bk 40mg
- Guggul (Commiphora wightii) Exd. 40mg
- Lauki (Lagenaria siceraria) PI. 170 mg
- Excipients: Gum acacia (acacia arabica) 8mg
- talcum (Hydrated magnesium silicate) 8mg
- MCC (Microrcrystalline cellulose) 16 mg
- Croscamellose Sodium (Soduim carboxymethyl cellulose) 8 mg

CONCLUSION :

The miracle plant, Bryophyllum pinnata, has the medical ability to treat kidney stones, prevent kidney stones from forming, and remove existing ones, according to all available information and understanding about the plant's use in Ayurvedic medicine. Lastly, we tracked the patient in this study from the start of their suffering till the end of their treatment and their eventual recovery from it. Kidney stone dissolving may be facilitated by the plant's diverse range of chemical compounds or biological constituents. Further research is required to completely comprehend the information provided by Bryophyllum pinnata, as this study does not conclude the examination. According to research

on *Bryophyllum pinnatum*, the plant exhibits a variety of chemical constituents, including tannin, alkaloid, flavonoid, and glycoside.

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