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Research Article

Pharmacological And Medicinal Property of Bryophyllum: A Comprehensive Review

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Abstract

Bryophyllum pinnatum Family: (Kalanchoe pinnata), a traditional herb known as pattharchatta, or a life plant, is found in tropical and subtropical regions with warm climates. Its native origin is Madagascar. Bryophyllum has been widely used in traditional medicine for treating various ailments. It has been used in Ayurvedic medicine to address conditions such as kidney stones, fever, headaches, wound healing, anxiety, cough, asthma, and sleep disorders. The plant contains a significant diversity of bioactive compounds, including flavonoids, tannins, glycosides, steroids, bufadienolides, and polyphenols, which contribute to its medicinal potential. Tannins are polyphenolic compounds, known for their biological activity.

Recent pharmacological studies suggest that Bryophyllum pinnatum exhibits anti-inflammatory, antioxidant, antimicrobial, antitumor, nephroprotective, anticancer, hepatoprotective, and antidiabetic properties. Due to its antimicrobial properties, it is used for various infections.

Current studies on bryophytes highlight brief information about their chemical compositions and pharmacological research. Recently, research was conducted on Bryophyllum to know its therapeutic application in integrating traditional uses with modern medicine, the plant's potential in conventional medicine & drug development, and its role in promoting health.

This abstract gives a Detailed summary of Bryophyllum pinnatum's pharmacological and medicinal attributes and its value in traditional medicine and modern pharmaceutical development.

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INTRODUCTION

India's Bryophyllum pinnatum is a plant in the Crassulaceae family that is called by several names, such as miracle leaf, life plant, and air plant. It is a bioactive and phytochemical-rich plant located in tropical and subtropical regions like India, Pakistan, Myanmar, South Africa, the southeastern USA, the West Indies, New Zealand, the Philippines, and Brazil, originating from Madagascar. Mature Bryophyllum thrives in well-draining soil and warm weather, and it requires minimal water and fertiliser. Grows faster in warm climate regions. Research found that podophyllum pinnatum leaves have a high moisture content, containing around 83 % to 91% in fresh leaf samples that are stored in nature.

When we are suffering from cough, asthma, fever, kidney stones, ulcer, skin infection, high blood pressure, and other things, we use Bryophyllum as medicine. It contains bioactive

compounds like flavonoids, alkaloids, phenolic compounds, terpenoids, saponins, and cardiac glycosides. These bioactive compounds play major roles in promoting health and preventing diseases. It contains antimicrobial and antioxidant properties that help fight against harmful bacteria, viruses, and fungi.

Botanical Classifications

Kingdom	Plant
Subkingdom	Tracheobionta
Division(phylum)	Angiosperm (Flowering Plants)
Class	Educots
Subclass	Rosidae
Order	Saxifragales
Family	Crassulaceae
Genus	Bryophyllum
Species	Bryophyllum pinnatum

Regional names

English	Life plant
Hindi	pattharchatta
Tamil	Ranakalli
Malayalam	Ilamulachi
Telugu	Akapulusu
Urdu	Zakhm-ayat
Bengali	Pathorkuchi

Phytochemical Composition

Bryophyllum pinnatum contains a wide range of phytochemicals that are used in medicines.is known for its rich phytochemical composition and contains bioactive compounds with therapeutic potential.

Summary Of Phytochemicals Found In Podophyllum Pinnatum

Flavonoids

Flavonoids commonly found in medicinal plants like bryophyllum pinnatum contain antioxidant, anti-inflammatory, antimicrobial, cardioprotective, anticancer, and neuroprotective properties, property it used in traditional medicine and promote health.

Tannins

They are widely present in Bryophyllum species and play a crucial role in the plant's armour mechanism. Tennis is found in podophyllum pinnatum leaves; their presence helps in medicines, including astringent effect, antimicrobial activity, anti-inflammatory properties, and antioxidant activity.

Glycosides

Known as plant defence compounds, used in foods & medicine, e.g., artificial sweeteners or cardiac glycosides, heart disease, etc.

Steroids

Steroids are organic compounds with a specific molecular structure of four fused carbon rings. They are naturally found in podophyllum and play a significant role in various biological processes. Steroids reduce the growth of cancer cells, making them a valuable source of pharmaceutical research.

Bufadienolides

Bufadienolides are naturally found in Bryophyllum pinnatum, known for their medicinal properties, including anticancer and antimicrobial.

Polyphenols

Polyphenols are commonly found in plants; they protect plants from UV rays, and they act like antioxidants. It reduces the risk of heart disease and cancer. Their several type of polyphenols like-(Flavonoids, Phenolic acids, Lignans, and Stilbenes)

Pharmacological Activities of Bryophyllum Pinnatum

Antioxidant activity

These compounds are found in different plants like bryophyllum, amla, tulsi, giloy, neem, and green tea. Antioxidants such as vitamins E & C and preventing them from harming cells. Adelakin et al. (2024) demonstrated that flavonoid-rich fractions significantly attenuated oxidative stress markers in the brain and liver of rats exposed to neurotoxic and hepatotoxic agents.

Antidiabetic activity

Antidiabetic activity improves insulin function, inhibits α-glucosidase and α-amylase, and manages blood glucose levels. According to Daniel et al. (2024) and Akinola et al. (2025), administration of the leaf extract led to a significant reduction in blood glucose levels and amelioration of lipid profile abnormalities in diabetic rat models.

Anti-inflammatory activity

Anti-inflammatory activity refers to a substance's ability to reduce inflammation. Numerous plant-derived compounds, including flavonoids, alkaloids, and phenolic acids, have demonstrated notable anti-inflammatory properties.

Aliyu et al. (2007) reported that the ethanolic extract significantly suppressed inflammation in rats with carrageenan-induced paw oedema.

Antimicrobial activity

Interrupts bacterial and fungal cells because it contains bioactive compounds such as phenolics and bufadienolides. Research into antimicrobial activity also includes testing microorganisms' growth, which helps to disrupt bacteria, fungi, viruses, and pathogens.

Wound-healing activity

Wound-healing properties commonly observed in medicinal plants are bryophyllum, aloe vera, honey, and neem. Plant extracts - petroleum ether, alcohol, and water research conducted on albino rats revealed enhanced tensile strength of incision wounds. (Khan *et al.*, 2004) .The plant also contains ascorbic acid, which also helps in the wound-healing process (Okwu and Josiah, 2006)

Anticancer and antiviral properties

Anticancer activity refers to the ability of a substance to inhibit the growth of cancer cells. recently experimental studies have shown that the plant is rich in bioactive compounds such as alkaloids, phenolic, flavonoids, and bufadienolides, which contribute to reducing cancer cells

Neuroprotective activity

Bryophyllum pinnatum contains strong neuroprotective properties due to flavonoids, phenolic compounds, and antioxidants. These bioactive compound helps to reduce neuroinflammation and protect nerve cells

A 2024 study by Adelakin et al. found that methanolic and flavonoid extracts of Bryophyllum pinnatum improved memory, brain function, and regulated neurotransmitters.

Medicinal applications

Bryophyllum pinnatum leaves and roots are used in various traditional medicine systems across the globe, such as for kidney stones, ulcers, fevers, high blood pressure, skin infections, snake bites, insect bites, swelling wounds, healing wounds, and asthma is also used as pain relief and for skin diseases. (Nagaratna and Hedge, 2015) Here is a brief review \

Traditional Uses of Bryophyllum Pinnatum in Various Cultures:

Region	Traditional Uses
India	Used in insect bites, wound healing, as a remedy for kidney stones, ulcers, and coughs, and consumed as leaf juice
Africa	Treat high blood pressure, inflammation, and infections.
Caribbean	Usually used for pain, colds, and infections. Leaves used in tea
South Africa	Used for its anti-inflammatory and antibacterial properties. Also applied topically for burns and insect stings.
China	Used in kidney stones, cough, asthma, and sleep disorders.Abscesses, swelling, and bruises. Removing toxins and enhancing blood circulation
The Philippines and Southeast Asia	Used in digestive issues, cuts, and sprains

CONCLUSION

Bryophyllum species, particularly Bryophyllum pinnatum, demonstrate a wide range of pharmacological and medicinal qualities that support their traditional usage in a variety of therapeutic systems. Scientific research has proved its anti-inflammatory, antibacterial, antioxidant, antidiabetic, analgesic, and wound-healing properties, among others. These benefits are mostly due to the plant's diverse phytochemical makeup, which contains flavonoids, alkaloids, glycosides, and triterpenoids. Despite its significant therapeutic potential, further clinical research and extract standardisation are required to completely utilise and safely incorporate Bryophyllum into modern medical practice. Its natural origin and diverse effects make it an excellent choice for developing alternative or supplemental therapies.

The plant's leaves and juice have been intensively studied for their potential pharmacological properties. This plant's full summary highlights its significance and historic usage. The plant contains significant phytochemicals such as flavonoids, tannins, anthocyanins, glycosides, alkaloids, phenolic acids, and bufadienolides. The most recent data on the pharmacognostical, phytochemical, and pharmacological profiles of Bryophyllum pinnatum are the main focus of the current investigation. It has been determined that the miraculous herb has a large number of important active pharmacological ingredients that give plants their diverse therapeutic properties. The wisdom of its usage in traditional remedies has been clarified and supported by several investigations. To validate and support the use of the plant in traditional medicine, as well as to demonstrate its safety and effectiveness,

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