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Review Article

Pharmacological Potential of *Bryophyllum pinnatum*: A Comprehensive Review

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ABSTRACT

Herbal treatments are safe and efficient for treating a wide range of ailments. Western medicine, or allopathy, is primarily reliant on medicinal plants for some of its constituents. (1) The plant *Bryophyllum pinnatum* is widely used in traditional medicine for treatment of various ailments and well known for its hemostatic and wound healing properties. It is an indigenous and exotic plant. The plant is found naturally throughout the country. It is succulent, herb, leaves are variable size and leaflets are elliptic. (2) Phytochemical analyses have revealed the presence of alkaloids, cardiac glycosides, and flavonoids. This review seeks to comprehensively examine the medicinal potential of *Bryophyllum pinnatum*, focusing on its Ayurvedic significance, botanical characteristics, phytochemical composition and pharmacological studies. (3) This review highlights its chemical composition and medicinal benefits of *Bryophyllum pinnatum*. The plant contains natural compounds that give it these benefits. Although it's effective in traditional medicine, more research is needed to understand its full potential and ensure it's safe for modern medical use. Both native and exotic, the plant is important to traditional healers for treating a range of ailments including kidney stones, high blood pressure, asthma, colds, abscesses and bleeding disorders (4).

INTRODUCTION

Bryophyllum pinnatum, also called stone kidney plant, is a special type of plant that can grow new plants from its leaves. (5) *Bryophyllum pinnatum*. Linn (family: crassularaceae) is one of the most important medicinal plants. *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. (1) This plant is widely used by traditional practitioners for hypertension, skin disorders, asthma, cold, insect stings, and abscesses. (6) The secondary metabolites that have medicinal potential are derived from many plant sections including tannin,

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alkaloids, flavonoids, glycosides, and phenolic chemicals. Furthermore, it exhibits anti-inflammatory, Anti-diabetic, nephron-protective, hepato-protective, Anti-leishmanial, antiulcer, immuno-modulatory, and CNS depressant, analgesic, as well as anticonvulsant properties.

Chemical Constituents: -

Flavonoids Quercetin: A well-known antioxidant and anti-inflammatory compound.

Kaempferol: Another flavonoid with anti-inflammatory, antioxidant, and antimicrobial properties.

Tannins : These compounds are known for their astringent properties and contribute to the plant's wound-healing effects.

Alkaloids: An alkaloid with potential analgesic and anti-inflammatory activities. Berberine: Though more commonly found in other plants, some studies suggest its presence in *Bryophyllum* species.

Glycosides Bufadienolides: Cardiac glycosides that have shown potential in traditional medicine for treating heart conditions.

Organic Acids: Citric Acid: Aids in metabolism and energy production.

Malic Acid: Known for its role in the Krebs cycle and energy production in cells.

Phenolic Compounds Catechins: Antioxidants that help protect cells from damage.

Gallic Acid: Has strong antioxidant properties and potential therapeutic uses in treating various diseases.

Saponins: These are compounds known for their ability to lower cholesterol, enhance immune response, and exhibit antimicrobial properties.

Steroids Stigmasterol: A plant sterol that may contribute to the plant's anti-inflammatory and anticancer properties.

Essential Oils: The plant also contains various essential oils that contribute to its aroma and therapeutic properties, such as antimicrobial and anti-inflammatory effects. (14).

Air plant is a pleasing glabrous herb 0.3–1.2 m tall. Twigs obtusely four slanting, mature one are bright colored and newer ones are roseate spotted with snowy. Leaves are mutable and decussate inferior is typically humble/complex, superior ones are 3–5/7 foliate with extended petioles. Flowers are pendent, in large spreading panicles with opposite stout branches, pedicels slender. Sepals are red striated, green at the base & pale green above. Petals are reddish purple, swollen & octagonal at the base, lobes triangular. Filaments green at the base, pinkish below the anthers. Anthers are hastate, black. Styles green. Fruit are enclosed in a persistent papery calyx & corolla. Seeds are small, oblong-ellipsoid, smooth. (7)

Pharmacological Uses:

The leaves of *Bryophyllum pinnatum* used in holistic medicines for curing kidney and urinary bladder stone, intestinal problems, ulcers, arthritis, inflammation, conjunctivitis, menstrual disorders, migraine, wound and dysentery. According to Ayurveda the leaves are moderately toxic to insects. But in Unani the bark of this plant is toxic, alexipharmic, mordant to the bowel.



Anti-inflammatory activity:

According to recent studies that *Bryophyllum pinnatum* plant can reduce the fevers and show antiinflammatory, pain relief and muscle relaxant effects. In anti-inflammatory effects have been partially attributed to the immune modulatory and immunosuppressant effect[29]. Leaves of *Bryophyllum pinnatum* are used against the inflammation and allergic reaction which provoked by insect bites in Brazil(8)

Antimicrobial activity:

The antimicrobial activity of *Bryophyllum pinnatum* leaves due to the presence of these two compounds may contribute to wound healing, eliminate infections, and there by resulting to cell proliferation.(9)

Cytotoxicity on Testis

Studies revealed the cytotoxic effects of ethanolic extracts of *B. pinnatum* leaves on rat testicular cells at doses of 100 mg/kg and 200 mg/kg, administered orally over eight weeks. At 100 mg/kg, seminiferous tubules exhibited shrinkage with visible intracellular spaces. At the higher dose, a significant increase in intracellular spaces and a reduction in spermatozoa were observed. In

contrast, control groups displayed normal testicular histology.(10)

Anticancer activity:

The methanolic fraction of the leaves was discovered to have antiulcer properties. Premedication tests in rats revealed that the extract had significant protective action against gastric lesions caused by aspirin, indomethacin, serotonin, reserpine, stress, and ethanol; as well as significant protection for aspirin-induced ulcers in pylorus-ligated rats and histamine-induced duodenal lesions in guinea pigs; and significant enhancement of the healing process in acetic acid-induced chronic gastric lesions. In their investigation, Adesanwo et al found a significant reduction in ulceration and mean basal and histamine stimulated stomach acid output in a dose-dependent manner, proving its usage as an antiulcer drug in folk medicine .matozoa were observed. In contrast, control groups displayed normal testicular histology.(11)

Anthelmintic Activity

Helminthic infection is one of the most common infections in man, affecting a large population. The tannins present in the *Bryophyllum pinnatum* shows anthelmintic activity. The chloroform, methanol and aqueous extract of *Bryophyllum pinnatum* root causes death of worms and showed significant anthelmintic activity. The activity against Indian earth worm *Pheretima posthuma* is also investigated. (12)

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Wound Healing activity:

In a study using Sprague Dawley rats, topical presentation of ethanolic leaf cutting of Echinacea at a dosage of 100 mg/kg body weight was found to accelerate wound healing. On the 11th day after resection, the wound area in the treatment group was significantly reduced by 86.3%, while that in the control group was only reduced by 68.0%. Additionally, wound contraction was significantly increased and wound site edema was reduced in the treatment group.(14)

Hepatoprotective and nephroprotective

Liquid of the new leaves is recycled very efficiently for the management of jaundice in Bundelkhand area of India. Yadav et al. planned that the liquid of greeneries was originate additional active than ethanolic excerpt as showed by in vivo and in vitro histopathological studies for hepatoprotective activity of herbal and validates the usage of liquid of plant leaves in folk drug for jaundice (15)

Anti-diabetic activity

The present study reveals that the aqueous leaf extract of Bryophyllum pinnatum in four different doses ie, 200,400,800mg/kg and 800mg/kg+ glibenclimide 2mg/kg in diabetic induced rat

shows anti-diabetic activity. In these four the mixture of 800mg/kg aqueous extract+ glibenclamide 2mg/kg is more effective and efficient than other extracts27(16)

Immunosuppressive effect:

The aqueous extract of leaves of Bryophyllum pinnatum shows significant inhibition of cellmediated and humoral immune response in mice.

CONCLUSION

From this review, it is clear that Bryophyllum pinnatum is a widely available medicinal plant in India with many health benefits. The plant contains important active compounds like flavonoids, steroids, bufadienolides, glycosides, and organic acids. It has a wide range of medicinal properties, including antimicrobial, antifungal, anticancer, anti-tumor, and insecticidal activities. It also has other effects such as anti-ulcer, anti-inflammatory, pain-relieving (analgesic), blood pressure-lowering (antihypertensive), liver-protecting (hepatoprotective), kidney-protecting (nephroprotective), diuretic, anti-diabetic, anticonvulsant, antioxidant, muscle relaxant, labor-suppressing (tocolytic), and calming (neurosedative) effects. This review highlights the plant's pharmacological potential and provides valuable information for researchers interested in exploring its medicinal uses further(17).

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