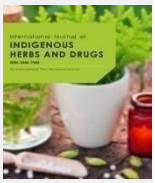
Short Communication

International Journal of Indigenous Herbs and Drugs
Content Available at www.saapjournals.org ISSN: 2456-7345



AN INSIGHT INTO MOTHER NATURE'S MIRACLE PLANT - KALANCHOE PINNATA

CHITRA N[1], NANDITHA S[2], VEZHAVENDHAN N[3]

[1]*Assistant Professor, Department of Oral Pathology & Microbiology, Asan Memorial Dental College and Hospital, Chengalpattu. Phd Scholar, Sri Balaji Vidyapeeth University, Pondicherry.*
[2]*Professor & HOD, Department of Periodontology, Asan Memorial Dental College and Hospital, Chengalpattu.*
[3]*Professor, Department of Oral Pathology & Microbiology, Indira Gandhi Institute of Dental Sciences, Sri Balaji Vidyapeeth University, Pondicherry.*

DOI: https://doi.org/10.46956/ijihd.v11i1.781

ARTICLE INFO

Article History
Received on: 14-08-2025
Revised on: 24-09-2025
Accepted on: 31-12-2025

***CORRESPONDING AUTHOR**
Nanditha S,
MDS, Professor & HOD, Department of Periodontology, Asan Memorial Dental College and Hospital, Chennai.

ABSTRACT

Kalanchoe pinnata, a perennial succulent plant inhabiting warm tropical climates, is a popular house plant with innumerable medicinal properties. This review gives an insight on the chemical constituents of the plant, medicinal properties and uses. The various clinical applications of the plant have been discussed in detail with focus on its anti cancer effects.

Keywords: *Kalanchoe pinnata, Bryophyllum calycinum, miracle leaf, Medicinal uses.*

INTRODUCTION

Kalanchoe pinnata (also called as miracle plant, air plant, goodluck leaf, Hawain air plant, life plant etc) is a perennial succulent plant belonging to the family Craussulacea. It is about 3-5 feet tall with a hollow stem & dark fleshy,spoon shaped,long pointed green leaves with serrated margins [1,2,3].

The leaves are succulent, fleshy, simple or compound in type. They may be pinnate or trifoliate in shape, that are oppositely arranged with variable number of leaflets ranging from approximately 5 to 25 cm in length & diameter of 2 to 12.5 cm. The leaves appear green to yellowish green in color, hairless in stalk which is about 2 to 10 cm long.

The plant produces leaflets which is a distinctive trait of the Bryophyllum family, to which it belongs. The leaflets of *Kalanchoe pinnata* are oval to elliptical in shape with obtuse rounded tips at the terminal. In case of detachment of the leaves from the stem, smaller plantlets are found to be formed occasionally, in scalloped margins of the leaflets [2,3].

This plant producesvibrant flowers especially during spring and winter, which are about 7 cm in length, tubular, bell shaped, pendulous and drooping.The stalks are usually 10 to 25 mm in length on which the flowers are arranged in branched clusters. The sepals appear yellowish, green to pale green, inflated and prominent. They may be partially fused to the tube,often streaked with red or pinkish color blotches. The fruits borne by *Kalanchoe pinnata* appear membranous and papery with four cylindrical carpels. It usually remains enclosed within the older parts of the flowers that contains large number of brownish colored seeds [3].

The plant is broadly shallow and is easy to grow by propagation through leaf or stem cuttings and it requires minimal care for maintainance(4,5,6,7).The plant is rich in alkaloids, bufadienolides, lipids, triterpenes, glycosides, flavonoids, cardienolides and steroids(8,9,10,11,12). The leaves contain a group of chemicals called bufadienolides which are highly active compounds. Bufadienolides like Bryotoxin A, B and C possess structural similarity and pharmocological activity similar to two well known cardiac glycosides such as digoxin and digitoxin. They also possesses antibacterial, antitumorous, cancer preventative and insecticidal actions [12,13,14] .

SYNONYMS

Bryophyllum calycinum, miracle leaf, *B. germinans, B. pinnatum, Cotyledon calycina, C. calyculata, C. pinnata, C. rhizophilla, Crassuvia floripendia, Crassula pinnata, Sedum madagascariense, Verea pinnata* [1,2].

CHEMICAL CONSTITUENTS

Numerous pharmacologically active compounds have

been identified and isolated from *Kalanchoe pinnata*over the past two decades. It has been found to be a rich source of alkaloids, glycosides, flavonoids, lipids, quercetin, steroids, triterpenes and cardienolides. Phytochemical studies have shown the presence of numerous substances such as Caffeic acid, ferulic acid, palmitic acid, coumaric acid, cinnamic acid, oxalic acid, Bufadienolides, Polysaccharides, minerals, alkanes,cinnamic acids, glycosides. The plants are also a rich source of vitamins, tannins, amino acids, organic acids, reducing sugars, esters, phenolic glycosides, terpenoids, hydrocarbons, minerals, saponins, organic acids, hydrocarbons and phenols [3,9,10,11,12,21, 27].

Bufadienolides are active compounds found in the leaves of the plant and constitute bryotoxin-A, bryotoxin-B, bryotoxin-C, digitoxin and digoxin , bryophyllol, bryophynol, bryophollenone, bryophollone, bryophyllin, bryophyllin-A. These components possess strong chemo-preventive, anti-tumour,anti-bacterialand insecticidal potentials [8-14). K.pinnata also possess essential fatty acids such as behenic acid, arachidic acid, stearic acid and palmitic acid(3,21) and some major anti-ulcer chemical constituents namely arachidic acid, astragalin, behenic acid, β-amyrin, benzenoids, β-sitosterol [3,9,10,11,12,21]. The presence of these high therapeutic value constituents, have led to its extensive usage in medicinal preparations over the years.

GENERAL APPLICATIONS & USES

1. K Pinnata has been used as a hemostatic agent owing to its astringent activities, in the management of various bleeding disorders.
2. It acts as a cough suppressant in the treatment of bronchitis and asthma.
3. It is used as a household antiseptic for treating skin disorders, wounds,deep cuts, swellings, sprains, ulcers, burns, boils, sprain, impetigo and insect bites.
4. The quercitrin flavonoids present in it are found to be effective against fatal Anaphylatic shock.
5. The leaf powder when taken along with black pepper is found to be effective against inflammation, blocked urination, mictuirition and leprosy.
6. It is used in the treatment of kidney disorder, kidney stones, necrosis of kidney, gall bladder stones, bloody piles and constipation.
7. Application of warmed leaves of K Pinnata over surgical sutures and wounds of skin, helps in preventing discolouration and appearance of scars.
8. Its profound anti-helminthic activity has proved to be beneficial in treating symptoms associated with cholera and dysentery.
9. Found to be effective in normalizing nitrogen level in urea. promote menstruation and assist childbirth during labourand beneficial in managing hemmorhoids and blood oozing piles.
10. It is found to be beneficial for common ailments such as headache and fever and in alleviating toothache and ear aches.
11. It is used in treating constipation, diabetes, liver disease, hepatitis, jaundice and much more.(3,17,18,19,20,21,22).

THERAPEUTIC PROPERTIES

Antidepressant activity

Ethanol and aqueous extracts of dried stems of K. pinnata,have been investigated for CNS depressant activity where the alcoholic extract showed greater CNS-depressant activity than the aqueous extract. Also methanolic extracts from the leaves of *k*.pinnata, were found to produce significant behavioral pattern alterations [5,6].

Antihelminthic property

The methanolic and petroleum ether extracts, when tested even at higher concentrations for antihelminthic activity against pheretima posthuma, did not exhibit any vermicidal activitysuggesting a poor antihelmintic property [7].

Antidiabetic property

The various flavonoids, polyphenols, triterpenoids and other chemical constituents of the plant were found to be responsible for its antidiabetic properties. also, the hydroalcoholic extract of plant showed, reduction in the blood glucose levels by increasing insulin secretion from pancreatic beta cells, enhancing the glucose uptake by peripheral tissues and inhibiting glucose production in the liver, reduction in LDL, and increase in HDL and triglyceride levels [1,2,4,15,22-24].

Antimicrobial activity

The methanolic content from the leaf extract (60%)was found to inhibit the growth of several microorganisms at a concentration of 25mg/ml except Klebsiella pneumoniae, Pseudomonas aeruginosa and Candida albicans species which showed resistance [1,2,25]

Antifungal activity

Presence of alkaloids, terpenoids, flavonoids, phenolic compounds in the leaves of K. Pinnata, have demonstrated potent antifungal activity, that inhibit essential enzyme activity, and interfere with fungal cell wall synthesis, ultimately leading to fungal growth inhibition and death [2,3,18,26].

Wound healing activity

The leaf extract prepared with petroleum, water and ether (acqueous form more potential than other forms) has been found to increase the tensile strength of the incision wound. also found effective in stimulating the proliferation and migration of fibroblasts, keratinocytes, and endothelial cells in the wound healing process thus accelerating the formation of granulation tissue and re epithelialization thereby leading to faster wound closure [1,2, 3,18,26].

Anti ulcer property

The ethanolic extract showed activity against acute ulcers, while aqueous extract did not prevent the formation of gastric mucosal lesions induced by indomethacine

Anticancer activity

Several studies have highlighted a possible anti cancer effect of alkaloids, flavanoids and phenolsextracted from the leaves of *kalanchoe pinnata*. These constituents exhibit cytotoxic effect on cancer cells such as inhibition of tumour growth, inducing apoptosis,prevention of angiogenesis in cancer cells and enhancing the effectiveness of cancer treatment as chemotherapy and radiotherapy [2,15]..

Isolated bufadienolides have been examined for their inhibitory effects on epstein barr virus early antigen

activation in raji cells, induced by the tumour promoter, and all bufadeinolides showed good activity, while bryophyllin a showed highest activity [2,15,22]. Among the five different bufadienolides isolated from *kalanchoe pinnata* leaves that were examined for the inhibitory effects on ebv-ea (epstein-barr virus early antigen) activation on raji cells induced by tumor promoter12-otetradecanoylphorbol-13-acetate. It was found that bufadienolides especially bryophyllin-a was shown to exhibit potential inhibitory effects while bryophyllin-c and bersaldegenin-3-acetate were found to be less active, suggesting bufadienolides to be potential cancer protecting and chemo preventing agents [6,16]..

A chloroform extract from leaves was used to evaluate anticancer,anti-human papillomavirus (HPV) activities and the cellgrowth inhibitory properties on HELA cells which confirmed that K. pinnata could act as an anti-HPV molecule possessing apoptosis-inducing property(7,8).

Antileishmanial activity

The presence of flavonoids coumarin (aglycone-type structure, as well as a rhamnosyl unit linked at c-3) quercetin andquercitrin, are found to be responsible for the antileishmanial activity. The protective effect of plant in leishmaniasis may be due to the activation of the reactive nitrogen intermediate pathway of the macrophages and not due to the direct effect on the parasite itself [7,27,28,29,30].

CONCLUSION

Kalanchoe pinnata, the "miracle leaf" or "life plant," is reported to possess various constituents that have medicinal and pharmacological uses. Its leaves are rich in bioactive compounds such as alkaloids, flavonoids and phenolic acids etc thereby provoking interest in its potential therapeutic applications in medicine. Additional detailed and in depth research and investigation regarding safety and efficacy, is required to have a complete assessment of this plant. Further exploration needs to be done in this direction to tap the potential benefits of this natural resource.

FUNDING

Nil

ACKNOWLEDGEMENT AND CONFLICT OF INTEREST

Not Declared

INFORMED CONSENT

Not Applicable

ETHICAL STATEMENTS

Not Applicable

AUTHOR CONTRIBUTION

Equal contribution from all authors

REFERENCES

1. Quazi Majaz A, Tatiya AU, Khurshid M, Nazim S, Siraj S. The miracle plant *Kalanchoe pinnata*: a phytochemical and pharmacological review. *Int J Res Ayurveda Pharm*. 2011;2:1478-82.
2. Mandal S, Ghosh S, Dey S, Sarkar T. A traditional life plant *Kalanchoe pinnata*: phytochemical and pharmacological studies. *Int J Multidiscip Res (IJFMR)*. 2024;6.
3. Rahman R, Al-Sabahi JN, Ghaffar A, Umar FN. Phytochemical, morphological, botanical and pharmacological aspects of a medicinal plant: *Kalanchoe pinnata* – a review article. *Int J Chem Biochem Sci*. 2019;16:5-10.
4. Biswas SK, Chowdhury A, Das J, Hosen SMZ, Uddin R, Rahaman MS. A review of the traditional medicinal uses of *Kalanchoe pinnata* (Crassulaceae). *Int J Pharm Pharmacol*. 2021;10:1-5.
5. Tajudin NJ, Ismail INA. Antimicrobial activity of *Kalanchoe pinnata*: a review. *Malays J Sustain Health Technol*. 2021;8:31-37.
6. Rahman R, Al-Sabahi JN, Ghaffar A, Umar FN. Phytochemical, morphological, botanical and pharmacological aspects of a medicinal plant: *Kalanchoe pinnata* – a review article. *Int J Chem Biochem Sci*. 2019;16:5-10.
7. Singh RK, Garg A, Shrimali K. Botanical description, phytochemistry, traditional uses, and pharmacology of the "wonder plant" *Kalanchoe pinnata* (Linn.) Pers: an updated review. *J Pharm Med Chem*. 2022;8:11-24.
8. Mahata S, et al. Anticancer property of *Bryophyllum pinnata* (Lam.) Oken leaf on human cervical cancer cells. *BMC Complement Altern Med*. 2012;12:15.
9. Marriage PB, Wilson DG. Analysis of organic acids of *Bryophyllum pinnatum*. *Can J Biochem*. 1971;49:282-95.
10. Gaind K, Gupta R. Alkanes, alkanols, triterpenes, and sterols of *Kalanchoe pinnata*. *Phytochemistry*. 1972;11:1500-2.
11. Gaind K, Gupta R. Identification of waxes from leaves of *Kalanchoe pinnata*. *Planta Med*. 1974;23:193-7.
12. McKenzie RA, Franke FP, Dunster PJ. The toxicity to cattle and bufadienolide content of six *Bryophyllum* species. *Aust Vet J*. 1987;64:298-301.
13. Yamagishi T, Haruna M, Yan XZ, Chang JJ, Lee KH. Antitumor agents. 110. Bryophyllin B, a novel potent cytotoxic bufadienolide from *Bryophyllum pinnatum*. *J Nat Prod*. 1989;52:1071-9.
14. Rastogi RP, Mehrotra BN. *Compendium of Indian Medicinal Plants*. Vol. 5. New Delhi: PID; 1990-1994. p. 141-3.
15. Yadav NP, Dixit VK. Hepatoprotective activity of leaves of *Kalanchoe pinnata* Pers. *J Ethnopharmacol*. 2003;86:197-202.
16. Biswas SK, Chowdhury A, Das J, Hosen SZ, Uddin R, Rahaman MS. Literature review on pharmacological potentials of *Kalanchoe pinnata* (Crassulaceae). *Afr J Pharm Pharmacol*. 2011;5:1258-62.
17. Dalziel JM. *The Useful Plants of West Tropical Africa*. London: Crown Agents for the Colonies; 1937.
18. Rajsekhar P, Bharani RA, Ramachandran M, Angel KJ, Rajsekhar SPV. The "wonder plant" *Kalanchoe pinnata* (Linn.) Pers.: a review. *J Appl Pharm Sci*. 2016;6:151-8.
19. Sharker SM, Hossain MK, Haque MR, Chowdhury AA, Kaisar A, Hasan CM, et al. Chemical and biological studies of *Kalanchoe pinnata* (Lam.) growing in Bangladesh. *Asian Pac J Trop Biomed*. 2012;2:S1317-S1322.

20. Akinpelu DA. Antimicrobial activity of *Bryophyllum pinnatum* leaves. *Fitoterapia*. 2000;71:193-4.
21. Kamboj A, Saluja AK. *Bryophyllum pinnatum* (Lam.) Kurz.: phytochemical and pharmacological profile: a review. *Pharmacogn Rev*. 2009;3:364.
22. Supratman U, Fujita T, Akiyama K, Hayashi H, Murakami A, Sakai H, et al. Anti-tumour promoting activity of bufadienolides from *Kalanchoe pinnata* and *K. daigremontiana* × *tubiflora*. *Biosci Biotechnol Biochem*. 2001;65:947-9.
23. Parez AC, Correa MF, Borges SR. Antiulcer activity from leaves of *Bryophyllum* spp. *Arch Vet Sci*. 1999;4:111-2.
24. Ogbonnia SO, Odimegwu JI, Enwuru VN. Evaluation of hypoglycemic and hypolipidemic effects of aqueous ethanolic extracts of *Treculia africana* and *Bryophyllum pinnatum* and their mixtures on streptozotocin-induced diabetic rats. *Afr J Biotechnol*. 2008;7:2535-9.
25. Akinpelu DA. Antimicrobial activity of *Bryophyllum pinnatum* leaves. *Fitoterapia*. 2000;71:193-4.
26. Mahamood K, Patil PK. Influence of *Bryophyllum pinnatum* leaf extract on wound healing in albino rats. *Indian J Pharmacol*. 2002;34:151-2.
27. Kalita K, Kashyap B, Ahmed R, Sarma H, Dutta KN, Deka K, et al. Distribution, ethnomedicinal uses, phytochemical profile and pharmacological activities of *Kalanchoe pinnata* (Lam.) Pers.: a review. *J Bioresour*. 2022;9:1-6.
28. Pattewar SV. *Kalanchoe pinnata*: phytochemical and pharmacological profile. *Int J Phytopharm*. 2012;2:1-8.
29. Rocha LG, Almeida JRGS, Macedo RO, Barbosa-Filho JM. A review of natural products with antileishmanial activity. *Phytomedicine*. 2005;12:514-35.
30. Muzitano MF, Luzineide WT, Catherine G, Kaiser CR, Ross-Bergmann B, Costa SS. The antileishmanial activity assessment of unusual flavonoids from *Kalanchoe pinnata*. *Phytochemistry*. 2006;67:2071-7.