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An Assessment on Medicinal Uses and Biological Activity of Bryophyllum Pinnatum

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ABSTRACT

Background: The prevalence of kidney stones (Urolithiasis) is affecting 12% of world population at the age of 20-30 years and it happens more frequently in men than women, but now a day's kidney stones are found in young children's at the age of 5 years also and their main cause is not drinking enough fluids and high intake of ultra-processed foods. To highlight the properties of Kalanchoe pinnata as herbal remedy for kidney stones. Material and Methods: 25 research papers were selected from Pub Med, research scholar, science direct, herbal medicine and other reputed journals. Result: Kalanchoe pinnata has significant ability to dissolve (calcium oxalate) that is most common element in forming stones in urinary tract and also carry lots of phytochemicals such as flavonoids, quercitrin, glycosides, carotenoids, saponin, kamferol and alkaloids. These flavonoids prevent forming of CaOx crystal and calcium oxalate deposition in renal tubules. Kalanchoe pinnata plant extract also reduces the size of calcium oxalate stone and has treatment and preventive action in urolithiasis. And also cure Properties such as Diuretic and Antiurolithic, anti-diabetic, anti-microbial, anti-inflammatory, anticancer, anti-ulcer, wound healing,Antileishmanial, Anticonvulsant, Antiproliferative, Hepatoprotective, Immunosuppressive and Immunomodulatory by leaf extract of Kalanchoe pinnata which contain phenolics compound, tannins, titerpenses, steroids, lipids, cardienolides. Conclusion: Considering the properties of Kalanchoe pinnata herb, a study should be conducted to develop a product and treat kidney stone by Kalanchoe pinnata as herbal remedy.

INTRODUCTION

Brazil, China, India, Africa, and all tropical nations are home to this species. It can be found in Brazil's northeast (Bahia, Ceará, and Paraba), north (Acre), southeast (Esprito Santo, Rio de Janeiro, Minas Gerais, and So Paulo), middle (Distrito Federal, Mato Grosso, and Mato Grosso), and south (Paraná, Rio Grande, and Santa Catarina), primarily in the coastal and Caatinga zones(1).The plant Bryophyllum pinnatum is a perennial vegetable with a glabrous and tuberous stem that is succulent and corpulent. This species can grow as tall as 150 cm. The youngest stalks are reddish with blemishes and have a lighter color than the oldest ones. Its leaves vary and are decussate, with the lowest ones typically being simple or occasionally imparinate. The leaves are 30-cm long, 3- to 7-foliated, long petiolate, fleshy, dark, and with crenate borders on the upper surface(2).In certain regions of India, the Crassulaceae family member bryophyllum pinnatum is utilized extensively as a traditional medicine. Kidney stones, particularly using Bryophyllum pinnatum(3) (Kamboj *et al.*, 2009).In Bengal, the majority of Unani and Ayurvedic medical professionals as well as conventional healers use this plant to cure conditions like hemorrhoids, renal calculi, ulcers, and diarrhea(4)(Salahdeen *etal.*, 2006). Urinary stones were treated with extracorporeal shock wave lithotripsy (ESWL) in the 1980s. In patients who were treated with ESWL, the recurrence rate of stones is almost 70% in 5–10 years. Appropriate therapies, consistent medication use, and dietary habits may help to lower the recurrence rate. Serious kidney damage is also one of ESWL's harmful side effects. Under the guidance of radiologists, a new extraction technique called "a percutaneous nephrostomy" has been developed so that renal calculi can be broken up. When used alone, this action strategy lessened the negative effects of surgery or eliminated the need for open employable mediation(5).

PLANT DETAILS

Plant Name: *Bryophyllum pinnatum*

Family: Crassulaceae

Synonym: Kalanchoe Pinnata

Common Name: Cathedral bells, Love plant, good luck leaf, green mother of millions, Curtain plant, Pattharchoor , Parnabeeja, Saião or Coirama , Zakham –e –hayat.

Taxonomical Classification:

Kingdom: Plantae

Subkingdom: Tracheobionta

Division: Spermatophyta

Subdivision: Magnoliophyta

Class: Magnoliopsida

Subclass: Rosidae

Order: Saxifragales

Family: Crassulaceae

Genus: Bryophyllum

Species: *Bryophyllum pinnatum* (Lam.)

(3) (Ghani *et al*., 2003 and Subrata *et al*., 2011)

Ayurvedic properties

Guna (Quality) : Laghu

Ruksha Rasa (Taste) : Kshay, Amal

Vipak (Metabolism) : Madhur

Virya (Potency) : Sheet

Prabhav (Impact): Rakta-stambhan[21]

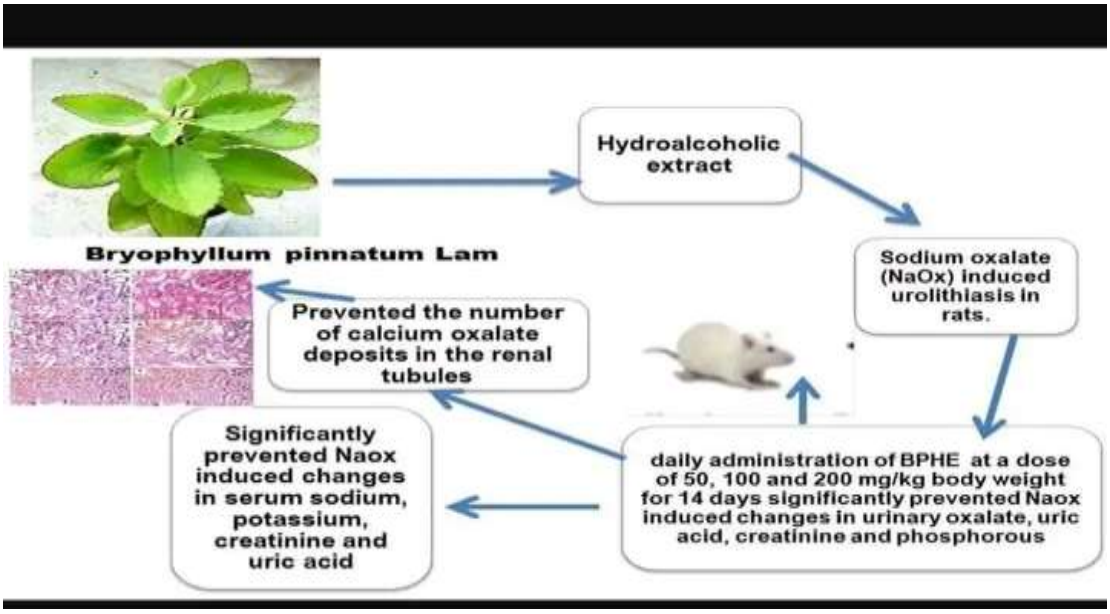
Chemical Constituent

The plant contains a variety of substances, including alkaloids, tannins, phenolic compounds, bufadienolides, saponin glycosides, and flavonoids. Along with alkaloids, flavonoids, tannins, phenolic compounds, and saponin glycosides, the plant also contains ascorbic acid, riboflavin, thiamin, and niacin. According to the classifications of numerous naturally occurring flavonoids, there are flavones, flavans, flavanones, iso flavonoids, chalcones, aurones, and anthocyanidines.(4)(Nwali *et al*., 2012). It also contains kaemferol 6 along with syringic acid, caffeic acid, 4-hydroxy benzoic acid, parahydroxy cinnamic acid, paracoumaric acid, ferulic acid, protocatechuic acid, phospoenolpyruvate, astragalin, rutin, kaemferol, luteolin, and quercetin. The plant included three flavonoids that have antileishmanial properties. Additionally, bufadienolides such bryophyllin A, B, C, and bryophyllon are included.(5)(Kanika *et al*., 2011)

Demonstrated dose-dependent antiurolithiatic capacity

With noteworthy reversal of NaOx-induced ion excretion and urinary CaOx concentration, oral treatment of BPHE at dosages of 50, 100, and 200 mg/kg to rats with sodium oxalate-mediated renal calculi demonstrated dose-dependent substantial (P0.05) antiurolithiatic potential. These results support the long-standing practice of treating renal calculi with Bryophyllum pinnatum hydroalcoholic extract (BPHE).

GraphiIn these mouse models,



(6)(R.B. Pandhare et al.,2021)In these mouse models, BP showed antiasthmatic and antitussive effects. These characteristics may support its usage in traditional Nigerian medicine.(7)(Edward O Salami et al.,2013)

HISTORICAL BACKGROUND OF HERBAL PLANTS

Other primates are aware of the healing abilities of plants and use them. Numerous ape and monkey species have been shown to include anthropogenic, immunostimulant, antibacterial, antidiarrheal, anti-inflammatory, digestive aids, analgesic, and reproductive regulators. While archeological evidence demonstrates that people have used medicinal herbs continually since the beginning of time. Different prehistoric cultures employed botanical compounds for psychological and physical goals.(8) Ayurveda, which originated in India, Western medicine, which developed in Mesopotamia, Chinese medicine, which developed in China, Unani Medicine, which emerged in Greece, and other medical systems have all used them, demonstrating this.(9) In a 60,000-year-old grave in Iraq, eight medicinal plants were discovered, including Ephedra sinica, Stapf. Ever since the beginning of time, people have used botanicals. The sick were treated with herbs. They were supposed to have healing powers as well as souls. The Greek philosopher Aristotle thought that plants had Psyche. One plant that resembled brain tissue and was frequently used as a brain tonic was Juglans regia Linn. The earliest known medical text is the "Ebers papyrus" of Egypt, which dates to 1500 BC. It contains instructions for making poultices and ointments, 700 medications, and 800 pharmaceutical formulas.(10)Selvakumar, P. (Dr. P. Selvakumar, Department of Chemistry, Dhaanish Ahmed Institute of Technology, Coimbatore - 641 105, Tamil Nadu, India.)

antitumor activity against a variety of cancerous cells, including leukemic cells and MCF7 breast cancer cells. At the moment, they are applied to wound dressings to prevent delayed diabetic wound healing.(11)and to make CVC's (central venous catheters) with antibacterial properties(12) . Due to their antimicrobial properties, they are also very important in dentistry where they prevent tooth decay and black stains on teeth.(13)

Physicochemical constant of Bryophyllum pinnatum kurz

Sample identity	%LOD	% Total Ash	Acid insoluble ash %	Water soluble ash %	Water soluble Exractive value%	Alcohol soluble Exractive value%
Leaves	4.8	25	3	23.5	34	8.3

[22]

Pharmacological activities

Anti- Diabetic activity

Thes research showed that B. pinnatum aqueous leaf extract had anti-diabetic properties at four different doses (200, 400, 800 mg/kg, and 800 mg/kg plus glibenclamide 2 mg/kg) in diabetic rats that had been given high doses of glucose (Glucose D) to cause diabetes. In comparison to the other dose, the 200 mg/kg aqueous extract caused a significant drop in blood sugar. But compared to the use of 200mg/kg and the other single doses, the combination of 800mg/kg aqueous extract + 2mg/kg glibenclamide proved to be more effective & efficient.(14)(Aransiola EF, Daramola MO, Iwalewa EO, Seluwa AM, Olufowobi OO. Anti-Diabetic effect of Bryophyllum pinnatum leaves. International Journal of Biological, Veterinary, Agricultural and Food Engineering. 2014; 8(1):95-99.)

Anticancer Activity

Bryophyllin (C26H32O8), a substance with anticancer properties against cancer cells, was found in the Bryophyllum pinnatum plant. It has been shown that the chloroform extract of the plant and its divisions inhibits the growth of human cervical cancer cells in a concentration-dependent manner. The portion, which was more potent than the extract, successfully combated the human papilloma virus, which plays a critical role in the development of cervical malignant growth.(15)(1 SHAHANA JABI 1 Shri Guru Ram Rai University, Dehradun-248001)

Anti-inflammatory and Analgesic activity:

The leaves and flowers of Bryophyllum pinnatum are typically used for their analgesic and anti-inflammatory properties. Flavonoids found in it have the capacity toreduce the activity of the cyclooxygenase enzyme andtissue necrosis factor activity. A novel steroidal derivative has been isolated from leaves, and its structure is now also known. When compared to diclofenac, this new steroidal compound was found to be effective in reducing inflammation in an aqueous extract when tested on carrageenan-induced rat paw edema. Furthermore, when tested using a mouse model of acetic acid-induced writhing, it showed a 75.72% protection in analgesic activity(16).(The Journal of Animal & Plant Sciences, 29(6): 2019, Page: 1528-1534 ISSN: 1018-7081).

Antihypertensive activity

The herb has hypotensive activity, which supports the traditional usage of the herb in the treatment of hypertension. The plant that certain Yorubas in Western Nigeria frequently use to treat hypertension of all kinds and grades. The macroelement that was most prevalent in the plant was calcium. Blood coagulation and the stability of intracellular cement components depend on normal quantities of extracellular calcium [17].Given the correlation between salt intake and hypertension in humans, B.Pinnatum's decreased sodium content may be an added benefit [18].

Antibacterial activity

Compounds with phenolic content show that the plant has antimicrobial properties. plant is useful in treating bacterial infections, including those brought on by S. aureus, E. coli, B. subtilis, P. aeruginosa, K. aerogenes, K. pneumoniae, and S. typhi, according to Ofokansi et al. (2005). In his investigation, the antibacterial properties of the methanolic extracts and infusion were tested using the agar diffusion method against S. aureusi ATCC 13709, E. coli ATCC 9637, Bacillus, P. aeroginosa, K. pneumonia, and S. typhi; additionally, a modifiedcheckerboard method was used to test the antibacterial activities of the extracts against S. aureus, E. coli, S. typhi, Klebsiella spp. and P. aruginosa. According to these results, it can be used to treat a newborn baby's placenta and navel, which not only heals quickly but also stops infections from forming[18].Because of their antibacterial, analgesic, and antispasmodic properties, pure isolated alkaloids and their synthetic derivatives are utilised as fundamental medical agents[19].

RESULT

The plants are well-known and have long been thought to have therapeutic properties. It is intended that the thorough information supplied in this study on the plant’s phytochemical ingredients and various biological properties of extracts and constituents would inspire an assessment of the plant’s potential medical applications.

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