**Title of the Research Project: A Detailed Study on Isolation and Pharmacological Activity of BryophyllumPinnatum.**

**Priyanka P.Thore , Pallavi P.Sambarkar.**

**SDMVM´s Diploma in pharmacy institute Chh. Sambhajinagar.**

*Abstract-Bryophyllum pinnatum* (syn.*Kalanchoe pinnata*), is a perennial succulent herb that originated from Madagascar, it is divine herb contains many valuable active pharmacological constituents that are responsible for plant various therapeutic effects, In recent years, a number of research were conducted on the chemical constituents, pharmacological effects, and clinical efficacy of *Bryophyllum*. Here the pharmacological and clinical data are reviewed. Recent studies suggest different pharmacological activity of *B. pinnatum*.

**Keywords:** *Bryophyllum pinnatum*, Crassulaceae, Anthroposophic medicine, Phytochemistry, Pharmacological activities, Clinical studies.

**Introduction: -**Globally, medicinal plants are extensively used for the treatment of various diseases (Gover *et al.,* 2002).According to the World Health Organization (WHO), medicinal plants are the great source to offer a diverse range of potential therapeutic drugs and these drugs can be relatively safe and economical as compared to the synthetic medicines (Mekuria *et al.,* 2017; Ekor, 2014;Bahmani *et al.,* 2014). Since the last many years, herbal drugs are increasingly focused by the researchers and several plants are being monitored for their prospective therapeutic effects (Uprety*et al.,* 2010).

**Vernacular names**

English: Air plant

Hindi: Zakhmhaiyat, Patharchur

Bengali: Koppatha, Patharkuchi

Sanskrit: Parnabeeja, Asthibhaksha

Other common names include: Miracle leaf, Mexican Love plant, Panfutti, Divine herb, Wonder of the World (Pattewar, 2012), Canterbury bells, life plant, air plant and Cathedral bells (Plangger*et al.,* 2006; Naz*et al.,* 2009; Kamoj and Saluja, 2017).

**Taxonomy**

Kingdom: Plantae

Vascular plants Division: Spermatophyta

Order: Rosales

Family: Crassulaceae – stonecrop

Genus: Bryophyllum

Species: *Bryophyllum pinnatum*(Lam.) Kurz

**Distribution:** *Bryophyllum pinnatum* is indigenous to Madagascar. It grows of course and originate in the temperate regions of Asia, Galapagos, West Indies, NewZealand, Macaronesia, Mascarenes, Caribbean.

**Phytochemical constituents:** *Bryophyllum pinnatum* contains numerous important chemical constituents and secondary metabolites Such as Flavonoids, steroids, terpenoids, phenolics, Vitamines alkaloids, bufadienolides, glycosides tannins. Flavonoids present are quercitrin, 4’-dimethoxy quercetin 8-methoxyquercetin-3, plant leaves contains bufadienolides like bryophyllin B and A. The herb is an outstanding reserve of vitamins like a Vitamin C, Vitamin B3, and B1 and as well as minerals i.e. Ca, Mg, Na, P, K and Zn (Milad*et al.,* 2014).

**Biological and pharmacological effects**

**Anti-inflammatory and Analgesic activity:**

*Bryophyllum pinnatums* plants and its flowers are used for the a reduce the other types of inflammation and pain-relieving effects. It contains flavonoids which have ability to inhibit the cyclooxy genase enzyme and minimize the activity of α- tissue necrosis factor (Ferreira *et al.,* 2014).Leaves ethanolic extract was proved to be effective against the topical acute and chronic inflammation which is due to stuffing of the arachidonic acid pathway(Chibli *et al.,* 2014).

**Anti-allergy activity:** An *Experimental research* study has shown that the plant is help to relieve sneezing and itching. Its anti-allergic effect is due to the halting of antigen induced mast cell degranulation and also by minimizing the secretion of histamine (Cruz *et al.,* 2008).

**Anti-diabetic activity:** For many years, the plant has been utilized for its anti-hyperglycemic effects. Furthermore, an advance research has confirmed its efficiency in heart diseases and in diabetes (Ojewole, 2005).

**Antihypertensive activity:** Medicinal herb is used to treat various cardiovascular related disorders in folklore therapeutics (Tedge *et al.,* 2005). Now it is confirmed that aqueous extract of the leaves has an antihypertensive effect of folk medicines. It has been demonstrated that the extract has potent antioxidant effect on aorta thus plays a significant role in the lessening of blood pressure (Bopda *et al.,* 2014).

**Anti leishmanial activity:** Flavonoids present in the herb are responsible for its anti leishmanial effects. In the aqueous extract of leaves, it has been proven by testing three flavonoids separately against the *Leishmaniaamazoneni s*amastigotes in comparison with quercitrin, quercetin and afzelin.

**Antimicrobial and Antifungal activity:** The plant different crude extracts were analyzed for their antimicrobial effect and it was determined that the extracts have broad spectrum anti-bacterial activity (Aqiland Ahmad, 2003). Remarkable antibacterial activity was confirmed against gram positive and gram negative bacteria by the ethanolic extract of the plant (Biswas*et al.,* 2011). A methanolic extract of the roots was found to be effective against *S. aureus, P.* aeruginosa

And *E. coli* but not effective against *C. albicans* (Majaz*etal.,* 2011).

**Urolithic activity:** The medicinal herb is used for the treatment of renal stones in traditional medicines (Tedge*et al.,* 2005). Leaves aqueous extract significantly reduces the level of urine oxalate and therefore it can be helpful in the cure of urolithiasis (Shukla*et al.,* 2014). This medicinal herb is used to treat kidney stone treatment. *Bryophyllum pinnatum*is useful in the reduction of renal stones because it increases the excretion of oxalate crystals by reducing the size of crystals and by altering them from dehydrate crystals to calcium oxalate monohydrate form (Yasir and Waqar, 2011).

**Gastro protective/ Anti-ulcer activity:** *Bryophyllum pinnatum* prevention or amelioration of injury to the gastrointestinal tract and it has been verified by its remarkable dose dependent defensive effect on ethanol induced gastric injury. However, more studies should be carried out to authenticate its make use of in stomach ulcers (Sharma *et al.,* 2014).

**Effect on hematological parameters:** *Bryophyllum pinnatum* methanolic extract of the leaves has exhibited amarked effect on various hematological parameters i.e. It Enhance the hemoglobin level, packed cell volume and total white blood cell count (Aprioku and Igbe, 2017).

**Hepatoprotective activity:** The plant has been monitored for its hepato protective activity. Plant has shown an obvious hepato protective activity. Increased regeneration of hepatocytes and microsomal enzymes inhibition also defend the liver from damage (Yadav and Dixit, 2003).

**Anti-oxidant activity:** The medicinal plant is tested forits anti-oxidant activity by metal chelating assay, 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay and 2,2’-azinobis-(3-ethylbenzothiazoline-6-sulfonic acid)(ABTS) assay. Study outcomes have indicated that the ethanolic extract has marked anti-oxidant activity (Sindhuand Manorama, 2015). Roots extracts have also exhibited the anti-oxidant effects when analyzed by DPPH assay(Gupta and Banerjee, 2011).

**Nephroprotective effects:** *Bryophyllum pinnatum* is widely used for its nephro protective activity. Outcomes of research have shown that this effect is dose dependent. The nephro protective effect is due to the plant anti-oxidant and radical scavenging properties (Harlalka *et al.,* 2007). It issuggested that the juice of leaves is more effective in the cure of hyperactive bladder and has fewer side effects than anti-cholinergic drugs (Schuler *et al.,* 2012).

**Wound healing activity:** The plant is used topically for the healing of wounds in traditional therapeutics. It is proposed that the plant has saponins in huge amounts which promote wound healing by aggregating the erythrocytes. Furthermore, tannins present in the plant also improve the process of wound healing because of their astringent effect (Pattewar, 2012).

**Neuro sedative and muscle relaxant activity:**

*Bryophyllum pinnatum* has marked effect on the CNS and it has been proven that the methanolic extract produced a significant change in behavior pattern. A study results have demonstrated that the herb caused the CNS depression and dose-dependent stimulation of pentobarbitone sleeping time (Ojewole, 2005). Another study has also suggested that it is useful in treating the sleep troubles during pregnancy (Afzal *et al.,* 2013). The medicinal plant is helpful for the treatment and management of seizures and that was confirmed by testing on mice. It showed a dose dependent increase onset and duration of pento barbitone-induced sleep and decline of exploratory activities in the head-dip and evasion tests. In both strychnine and picrotoxin induced seizures it caused a late onset of convulsions (Yemitan and Salahdeen, 2005).

**Uterine relaxant activity:** In traditional therapeutics, the plant is used for to colysis and the rationale behind its use proven by *in vitro* studies and further research is still required (Gwehenberger *et al.,* 2004).

**Conclusion:** The current study focuses on the latest evidence base information regarding pharmacognostical, and pharmacological profile of the *Bryophyllum pinnatum*. It is concluded that the divine herb contains many valuable active pharmacological constituents that are responsible for plant various therapeutic effects. Different studies have explained and verified the wisdom behind its use in traditional medicines. More exploratory studies are still required to confirm and justify use of the herb in folk medicine and also to prove its safety and efficacy.

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