

A REVIEW ON - KALANCHOE PINNATA IS A TRADITIONAL AS WELL AS BIOACTIVE MEDICINAL PLANT USEFUL IN MULTIPLE DISEASES

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ABSTRACT

The main purpose of this review is to provide advance information of herb Kalanchoe pinnate, this herb contains a many of active constituents i.e.alkaloids, triterpenes, glycosides, flavonoids, steroids, bufadienolides, lipids and organic acids. This review we show various dosage form of kalanchoe pinnata which are available in market. In this review we are focus sing on various activities or uses of kalanchoe pinnata i.e. immunomodulator, CNS depressant, analgesic, antimicrobial, antiinflammatory, antiallergic, antianaphylactic, antileishmanial, antitumorous, antiulcerous, antibacterial, antifungal, antihistamine, antiviral, febrifuge, gastroprotective, immunosuppressive, insecticidal, muscle relaxant, sedative, anticancer as well as it is used as ,hepatoprotective, microbial activity ,antipyretic ,antidiabetic ,anticonvulant ,anti-inflammatory ephroprotective ,neuropharmacological ,antioxidant. It is also used in treatment of kidney stone. Nowadays this herb becomes imperiled plant which needs to be preserved as well as analyze for its significant green chemistry.

Keywords- Kalanchoe pinnata, Crassulaceae, pharmacognostic and phytochemical investigation, pharmacological effects, Dosage form.

I. INTRODUCTION

Kalanchoe pinnate commonly known as cathedral bells, air plant, life plant, miracle plant, and Goethe plant. ^[1] These plant is to popular house plant and has become naturalized in tropical and subtropical areas. This plant is native to Madagascar 2, inhabiting warm and temperate climates from sea level to 2,600 meter. It is also found in parts of Asia, Australia, New Zealand, the West Indies, Bermuda, the Philippines, Macaronesia, the Mascarenes, Brazil, Suriname, the Galapagos Islands, Melanesia, Polynesia, and Hawaii.^[2] Much of the reason for the widespread naturalization of this plant can be traced to its popularity as a house plant. It is a succulent, perennial plant, Length-1 m (39 in) tall, Stems are cylindrical, Tinge-Raddish. The leaves of this species are thick, fleshy, elliptical in shape, curved, with a crenate or serrated margin. The fruits are follicles (10–15 mm) which are found in the persistent calyx and corolla.^[3]It has red-orange flowers. The calyx is formed of a long tube, red at the base, veined with yellowish green (or green spotted with reddish brown), with four very small triangular lobes at the end. The tubular corolla. The ovary has four carpels, slightly fused in the center, with slender styles.^[4]kalanchoe pinnata is a active medicinal plants largely used in treatment of kidney stone, rheumatoid arthrities , gastric ulcer , pulmonary infection .



Fig 1: Kalanchoe pinnata leaf

Synonyms^[5]

Bryophyllum calycinum, B. germinans, B. pinnatum, Cotyledon calycina, C. calyculata, C. pinnata, C. rhizophilla, Crassuvia Floripendia, Crassula pinnata, Sedum madagascariense, Vereia Pinnata

Regional names--^[6] Hindi: zakhm- hayat , Arabic: kushnulhayat, Bengal: koppata ,Sanskrit: asthi-bhaksha, Telgu: simajamudu , Tamil: ranakalli , Kannad: ganduklinga ,Malayalam: elamurunga .

Biological source: Botanical Name: Bryophyllum pinnata Family: Crussulaceae.

Taxonomy of plants: ^[7]

Kingdom: Plantae (Plants)

Subkingdom: Tracheobionta (Vascular plants)

Super division: Spermatophyte (Seed plants)

Division: Magnolia -ophyta (Flowering plant)

Class: Magnoliopsida (Dicotyledonous)

Subclass: Rosidae

Order: Saxifragales

Family: Crassulaceae Stonecrop family

Genus: Kalanchoe

Species: Kalanchoe pinnata (Lam.)



Fig 2: Kalanchoe pinnata plant

Geographical source: -

Naturalized in temperate regions of Asia, Australia, New Zealand, West Indies, Macaronesia, Mascarenes, Galapagos, Melanesia, Polynesia, and Hawaii.

In India, it is cultivated in gardens and wild on the hills of north-western India, Deccan, and Bengal

II. MACROSCOPICAL CHARACTERS

Kalanchoe pinnata is a succulent glabrous herb.

1) Height-1-2 m

2) Stems - obtusely four-angled.

3) Leaves -variable and decussate.

4) Leaflets - ovate or elliptic and crenate or serrate in plant

5) Flowers - pedicels -slender, Calyx - 2.5-3.8 cm. length, red colored striated, Corolla-octagonal, Lobes - triangular.

Chemical constituents—

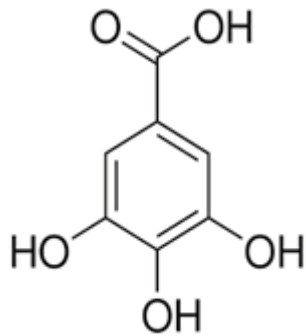
A) alkaloids, flavonoids, phenolic compounds, and tannins.

B) Macroelements are magnesium, calcium, potassium, phosphorous, and sodium.

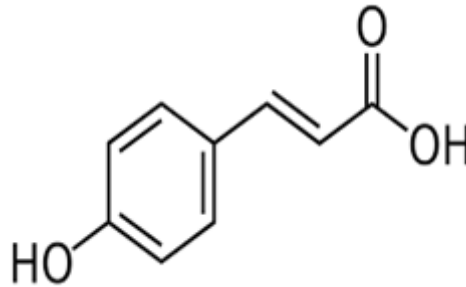
C) Microelements are-iron, zinc, vitamins, ascorbic acids, riboflavin, thiamine, niacin.

D) The herb contain gallic acid, caffeic acid, coumaric acid, quercetin, quercitrin isorhamnetin, kaempferol, bersaldegenin, bryophyllin a, bryophyllin c, bryophynol, bryophyllol and bryophollone, stigmasterol, campesterol, and another element.

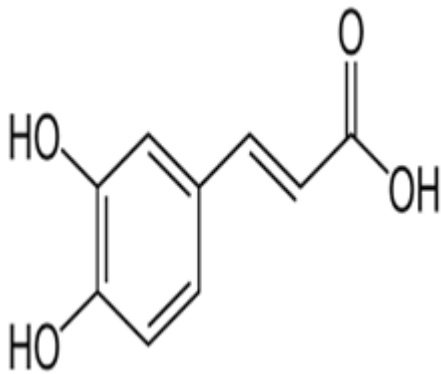
Chemical structure of *Kalanchoe pinnata*:



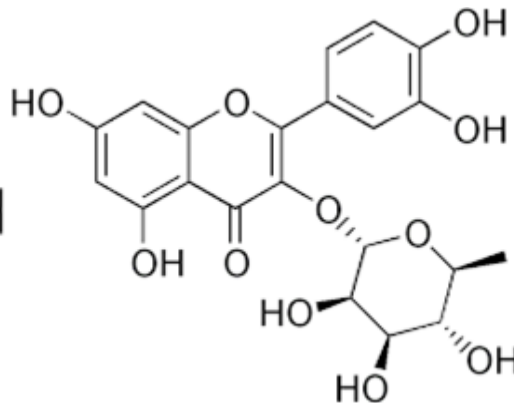
Structure 1. Gallic acid



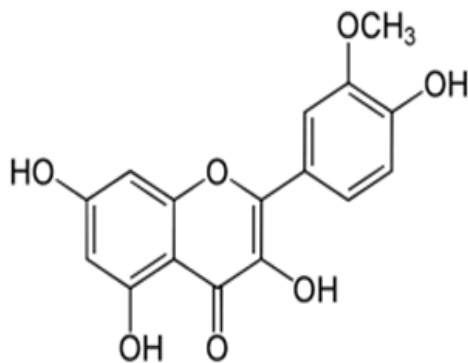
Structure 2 . P-coumaric acid



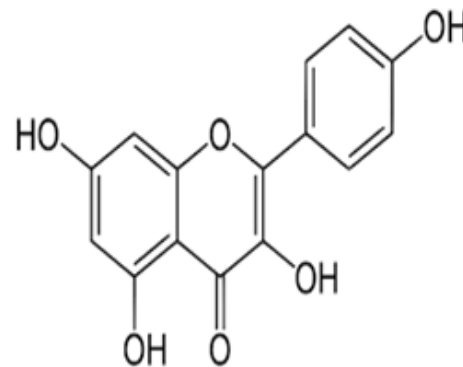
Structure 3. Caffeic acid



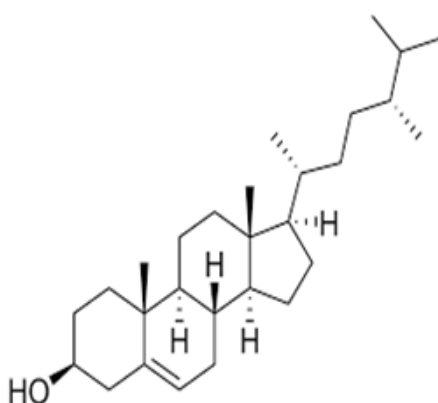
Structure 4. Quercitrin



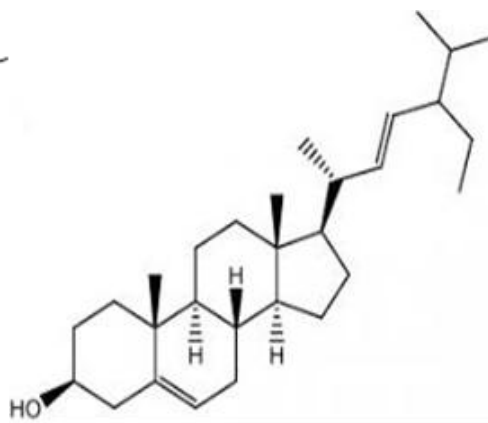
Structure 5. Isorhamnetin



Structure 6. Kaemferol



Structure 7. Campesterol



Structure 8. Stigmasterol

Ayurveda properties: [5]

Rasa: Kashaya, Alma Guna: Laghu Virya: Sheeta Vipaka : Madura Doshaghnata: Vatakaphahara

Description-

It is a glabrous herb 0.3-1.2m Hight, leaves variable decussate, the lower usually simple or occasionally compound, 8-12 and 6-8cm in size, the upper usually 3-5 or sometimes 7- folio late, long pointed, the petioles united by a ridge round the stem.

Uses of Kalanchoe pinnata:

- 1) Bronchial conditions
- 2) Fights diabetes
- 3) Enhanced sleep
- 4) Intestinal aid
- 5) Kidney stone
- 6) Skin conditions
- 7) Wound healing
- 8) Cold/Flue

III. MARKETED FORMULATION OF KALANCHOE PINNATA

1) CAPSULE



2) LIQUID FORM



3) JUICE



4) CREAM



5) SOAP



6) TINCTURE



IV. PHARMACOLOGICAL EFFECT OF THE PLANT

1) Antidiabetic activity--Hydro alcoholic extract of *Kalanchoe pinnata* (500mg/kg body wt) :

This *Kalanchoe pinnata* extract decreases the blood glucose level, triglyceride levels, and low-density lipoprotein level and this extract increase in high-density lipoprotein level. Swapnil B. Patil worked on *K. Pinnata* plans to evaluate anti-diabetic activity, they evaluate anti-diabetic action of *K. pinnata* through in vivo and in vitro studies. The DCM fraction of the plant demonstrated glucose-independent insulin secretagogue action similar to the currently used drug glibenclamide. [8]

2) Antimicrobial activity –*kalanchoe pinnata* leaf extract (60% methanol extract) : Leaf extract of a plant used to inhibit the growth of five out of eight micro-organism, at a concentration of 25 mg/ml. *klebsiella pneumoniae*, *pseudomonas aeruginosa* and *candida albicans* produced resistance. [9]

3) Anti-ulcer activity - The ethanol extract of *Kalanchoe pinnata*: This plant produce activity against acute ulcer, while aqueous extract did not prevent the formation of gastric mucosal lesions induced by indomethacin. [10]

4) Uterine relaxant -

Bryophyllum pinnatum shows relaxant effect in vitro on the contractility of human myometrium and reinforcing against fenoterol induced uterine contractility.

5) Hepatoprotective activity:

Juice of the fresh leaves is used very effectively for the treatment of the jaundice in folk medicine of bundelkhand region of India.

6) Anti-cancer activity--

Kalanchoe pinnata has components that could repress hallmarks of cancer, such as proliferation, apoptosis, cell migration, angiogenesis, or metastasis and regulate processes such as oxidative stress or autophagy. *Bryophyllum* compounds have marked anticancer therapeutic value against cancer cells. Bersaldegenin-1, 3, 5-orthoacetase inhibited cancer cell growth on several cancer lines.

7) Nephroprotective--

Harlalka et al report that the aq extract at leaves of *kalanchoe pinnata* posseses potent nephroprotective against gentamicin-induced nephrotoxicity in rats and in vitro antioxidant activity. Quercetin has nephroprotective and antioxidant role. The extract also normalised the gentamicin induced increase in urine and plasma creatinine. Blood urea and blood urea nitrogen level *k.pinnta* decrease urea level and brought back to normalcy and there was efficient reduction in the calcium oxalate level which inhibited stone formation after administration at ethanol of *Kalanchoe pinnata*. [11]

8) Antileishmanial activity-

Infections caused by protozoa at the genus *Leishmania* are major worldwide health problem, with high endemicity in developing countries. Quercitrin, a flavonoid is responsive for antileishmanial activity. The quercetin aglycon -type structure as well as rhamnosyl unit linked at c-3 seen to be important for antileishmanial activity. The protective effect of plant in leishmaniasis may not be due to direct effect on the parasite itself but rather activation of the reactive nitrogen intermediate pathways of microphages.

9) Immunosuppressive effect-

The fatty acid present in *k.pinnata* may be responsible at least impart, for its immunosuppressive effect in vivo. Rossi Bergmann et al showed the aq extract of leaves cause significant inhibition of cell mediated and humoral immune responses in mice. The spleen cells animals pre treated with plant extract showed a decrease ability to proliferate treatment with extract and also impaired the ability of mice to mount a delayed type hypersensitivity reaction ovalbumin.

10) Immunomodulatory effect -

Quazi major A .et was studied on male BALB mice and lou-m rats and eosinophil count ,or A specific IgE, T-cells proliferation, cytokine production, histamine release assay etc parameter were considered, the results showed that plant extract in quercetin flavonoid effectively protects mice against anaphylactic shock.

11) Wound healing activity--

The ethanolic extract of *k.pinnata* showed significant wound healing activity by decreasing the size of the affected area as well as edema at the wounded site. Nayek et reported that this may due to presence of steroidal glycoside and phenolic antioxidants.

12) Anti-fungal activity:

Adenike A. O. Ogunshe worked on the Nigerian Traditional plants to evaluate antifungal activity. They evaluated the plants against the various strains of these species (*Candida albicans*, *C. glabrata*, *C. tropicalis*, *C. pseudotropicalis*). it was later conclude that none off the strains of *C. pseudotropicalis* got inhibited by ethanolic extract of *kalanchoe pinnata* . While it shows the good inhibitory effects against other species.

13) Insecticidal activity:

Supratman et al., (2000) isolated two bufadienolides from the methanolic extract of *k. Pinnata*. Isolated compounds were reported to exhibit strong insecticidal activity against third instar larvae of the silkworm and the reason was associated with the presence of 1, 3, 5-orthoacetate moiety of the bufadienolides.^[12]

14) Anticonvulsant activity:

Bryophyllum pinnatum leaf extract (50, 100, 200mg/kg) given to the rats in groups and various test were performed Head dip and evasion test in mice, muscle tone (chinney test, inclined screen test and climbing test and anticonvulsant test (strychnin and picrotoxin induced convulsant in mice).the all extract showed positive results while 200mg/kg shows highest activity. Cytotoxic study reveled that the aq leaf extract of *Bryophyllum pinnatum* in dosage up to 20g/kg.^[13]

15) Antipyretic activity:

Biswas and Montel (2015) demonstrated the effect of plant extract on hyperthermic condition in laboratory animals. Pyrexia was induced in rats by injecting Brewer's yeast. When hydroalcoholic extract of *k. pinnata* was administered to the laboratory specimens, it reduced the body temperature thus exhibiting its antipyretic effect. The presence of flavonoids in the extract may be the reason for this activity.^[13]

16) Urolithic activity:

This extract significantly decreases urinary oxalate levels, suggesting that it may be beneficial in treating urolithiasis. This plant has long been used to cure kidney stones. *B. pinnatum* dissolves kidney stones by breaking down calcium oxalate dehydrate crystals into monohydrates. leaf extracts lowered oxidative stress and kidney stones development.^[14, 15]

17) Herbal tonic:

-Dietary fiber, niacin, and ascorbic acid are all found in the plant. This plant is used to cure prostate cancer as well as common cold. *B. pinnatum* and other herb extracts in herbal compositions are said to operate as tonics, boosting health and respiration.

Clinical uses:

- 1)The leaves are useful in burns, boils, bites of insects, congestive ophthalmia dysuria, diarrhea, dysentery, impetigo, polyuria, phlegmon, swelling, tuberculosis, ulcers and wounds.
- 2) The leaf juice 3g, jeera 3g and ghee 6g is mixed and given for blood mix diarrhoea.
- 3) The leaf poultice is applied on wounds, sprains, swellings and inflammations.
- 4) Leaf juice is useful in cholera.
- 5) The leaf juice mixed with kali mirch is useful in blood oozing piles and hemorrhoids.
- 6) The leaf powder with kali mirch is also useful in inflammation, burning in urination and blocked urination and leprosy.
- 7) The leaves roasted over fire are applied to places of wounds and surgical sutures in the skin to prevent discolorations of the skin.

V. CAUTION

- 1) Contraindicated if impaired digestive function.
- 2) Topical treatment may produce severe skin blisters.
- 3) Avoid long- term use because of its immune suppressant effects
- 4) Kalanchoe pinnata contains bufadienolides cardiac glycoside. These can cause poisoning, particularly in grazing animals.^[16]

VI. CONCLUSION

This review gives detailed information about Kalanchoe pinnata. This review not only gives information about Kalanchoe pinnata profiles but also the different pharmacological effects of the drug. The present reviews show the pharmacological potentials of Kalanchoe pinnata and are useful to researchers to give more information about this valuable plant. This present review shows the Kalanchoe pinnata drug has different Formulation or dosage forms that are available in the market and this is helpful for the future development of this valuable plant.

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