

# Pharmacological Activities of *Mukia Maderaspatana* (L.) Leaves - A Review

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**Abstract:** A Medicinal plant plays a vital role in traditional systems. It is necessary to reveal the pharmacological activities of individual plants for treating various diseases. The plant *Mukia maderaspatana* Leaves belongs to the family of cucurbitaceae. This plant is an indigenous plant traditionally it is used as an ingredient of various cocktail preparations and for the management of severe inflammatory disorders in Indian system of medicine and possess biological activities such as antioxidant activity, hepatoprotective activity, antibacterial activity, gastro protective activity, pharmacological activity, anti-inflammatory and antidiabetic for treating various diseases which are discussed in this review paper.

**Keywords:** Mukiamaderaspatana, cucurbitaceae, hepatoprotective, pharmacological activity gastro protective, anti-inflammatory and antidiabetic

## 1. Introduction

Herbs play a major role in all traditional medical system especially in Ayurveda, Siddha, Unani, Homeopathy and Naturapathy. The plants are promoting health promoting capacities and their bio active compounds prevent and cure the diseases. It is necessary to study the pharmacology activity of individual plants and how the bio active compounds deed in treating diseases. cucurbitaceae family are generally called gourds (Sugashini and Settu & Sathivelu Arunachalam, 2019). These plants are the source of raw material in pharmaceutical industries. A preliminary study was conducted to characterize phytochemicals present in *M. maderaspatana*, a plant drug used in traditional medicines. *Mukia maderaspatana* belongs to Cucurbitaceae genus. It is called Musumusukkai in Tamil. The aerial parts of plants are also used for vertigo and biliousness (Moumita Banerjee & Thankamani V, 2013). In Naturopathy, the drug from musumusukkai has been used to treat chronic respiratory disease for humankind, and drug product such as Asthacure, Asthmex, Bronkease, Respease and Musumusukkai chooranam, and also used as drug for cattle classically (Petrus A J A 2013). Industries relied with medicinal plants in field of cosmetic, food and pharmaceutical (Sugashini Settu & Sathivelu Arunachalam, 2019). This review paper deals with the pharmacological studies which have been explored.

## 2. Botanical Description

*Mukia maderaspatana* (Linn) is known as common name for musumusukkai. The leaves of plant are deltoid-ovate in shape. It is entirely angled or 3-5 lobed, acute or subacuminate, coarsely dentate-serrate, scabrous with tiny hairs on dorsal and ventral sides. Colour of the flower is yellowish. The matured fruits are spherical, shiny and red in colour (Rahman A.H.M.M et al., 2006). The leaves of *Mukia maderaspatana* are ovate and the margin are generally sagittate, cordate, macuronate, acuminate (Asha K Rajan et al., 2016).



Figure: *Mukia maderaspatana* leaves

## Taxonomy

The species of Cucurbitaceae family are monoecious and dioecious in nature (Rahman A.H.M.M et al., 2006). Taxonomical classification of *Mukia maderaspatana* are (Sujeethasai K, 2020).

Kingdom: Plantae  
Division: Sermatophyta  
Subdivision: Angiospermae  
Class: Dicotyledonae  
Sub-class: Polypetalae  
Series: Calyiflorae  
Order: Passiflorales  
Family: Cucurbitaceae  
Genus: *Mukia*  
Species: *maderaspatana*

## Pharmacological activity

The phytoconstituents in *Mukia maderaspatana* has high potential curing tendency for disorders such as asthma, histamine, bronchitis, chronic obstructive lung disorder, high fever, flu and also in the treatment of Rheumatoid arthritis, hypertension. It also reported that fruits of *Mukia maderaspatana* used in treatment of piles, polyuria, dysuria, tuberculosis. Fruit has been prepared as lehium and

consumed for treatment of naso-bronchial disorders, and also reduces pain during urination. Risks of osteoporosis in senior citizens is reduced by the plant extract, toothache is cured by chewing the roots of *Mukia maderaspatana* (Asha K Rajan et al., 2016).

#### Antidiabetic activity

Increase in level of blood sugar is seen in Diabetes mellitus (Sengottuvel T & Sanish Devan V, 2020). *Mukia maderaspatana* has been used for the treatment and prevention of diabetes. In in-vitro study the ethanolic extract of *Mukia maderaspatana* has potent inhibition on the enzymes  $\alpha$ -glucosidase and  $\alpha$ -amylase that are responsible for digestion of carbohydrates. The active inhibitory effect is performed by flavonoids, terpenes and phenolic compounds. Type 2 diabetes is reduced by the presence of Flavonoids (Ramachandran Vadivelan et al., 2012). Antihyperglycemic activity was proved by the ethanolic and aqueous extract of whole plant of *Mukia maderaspatana*. Ergosterol is an active compound extracted from the methanolic extraction of whole plant of *Mukia maderaspatana* exhibits antidiabetic activity (Jamuna S et al., 2015). *Cucumis melo* var *agrestis* belonging to Cucurbitaceae family possess antidiabetic potential, the hydroalcoholic leaf extract of *Cucumis melo* var *agrestis* inhibits movement of glucose across membrane (Sengottuvel T & Sanish Devan V, 2020).

#### Hepatoprotective activity

Albino rat liver is protected from carbontetrachloride (CCl<sub>4</sub>)-induced damages by aqueous extract of aerial parts of *M.maderaspatana*. Histopathology reports significant improvement in CCl<sub>4</sub>-mediated liver, and also maintained the levels of alanine aminotransferase (serum glutamic pyruvic transaminase-SGPT), aspartate aminotransferase (serum glutamic oxaloacetic transaminase-SGOT), alkaline phosphatase-ALP, Aniline hydroxylase activities by *M.maderaspatana* extract. Levels of serum glutamic pyruvic transaminase, serum glutamic oxaloacetic transaminase and alkaline phosphatase is reduced by aqueous extracts of *M.maderaspatana* in rats induced with streptozotocin. Methanolic root extract shows significant decrease in levels of -SGOT, -SGPT AND -ALP in diabetic rats at (500 mg/kg) (Petrus A J A, 2013).

#### Anti-inflammatory activity

Inflammation is caused by the denaturation of protein. The *Mukia maderaspatana* extract shows positive effect on inhibition of protein denaturation and proteinase activity. Proteinase activity is inhibited by extract of *M.maderaspatana*. Leucocyte proteinase plays a vital role in development of tissue damage in course of inflammatory reaction. Study on the methanol extract of *M.maderaspatana* proved excessive proteinase inhibitory activity. *Coccinia grangis* species of Cucurbitaceae family possess similar effect as *M.maderaspatana* (Mallikadevi T et al., 2012).

#### Antioxidant activity

Antioxidants protects the body from free radicals possessing radical scavenger property (Rekha Rajendran et al., 2010). Harshiny *et al* (2015). confirmed the antioxidant activity of *M. maderaspatana* by 2, 2-diphenyl-1-picrylhydrazyl (DPPH) assay. Oxidative stress is an imbalance between pro-oxidants and antioxidants. Oxidative stress leads the body to

diseases such as cancer and obesity. Compounds present in curcubits such as cucurbitacins B and E, belonging to family of tannins exhibits antioxidant activity and also possess free radical scavenging tendency (Agata Rolnik MSc & Beata Olas PhD, 2020). The plant constituents such as flavonoids, polyphenols, tannins and saponins are responsible for antioxidant activities. The free radicals are neutralized by phenolic phytoconstituent possessing hydrogen donation in nature (Udaya Prakash N.K et al., 2014). The 2, 2-diphenyl-1-picrylhydrazyl (DPPH) assay confirmed the antioxidant activity of *Mukia maderaspatana*. The radical scavenging assays such as DPPH, hydrogen peroxide and hydroxyl radical proved the antioxidant activity by the aqueous extract of *Mukia maderaspatana*. The acetone and methanol extract of roots, stems, leaves and fruits of *M.maderaspatana* exhibit antioxidant activities, the methanolic extract has higher potential than aqueous (Indhumathi paramasivam et al., 2017). Bioflavonoids like quercetin and catechin of polyphenolic compounds possess free radical scavenging and anti-inflammatory action (Moyeenudin H.M & Vijayalakshmi S, 2019).

#### Immunomodulatory activity

In in-vitro study the extract shows anticomplement effect in both classical and alternate pathways of complement system in human. Luminol-induced chemiluminescence is inhibited in dose-dependent manner by aqueous extract. In human immune system the outcome of whole plant by aqueous extract is examined (Petrus A J A, 2013).

#### Gastroprotective activity

The defensive effect of ethanolic extract of *Mukia maderaspatana* reduces gastric ulcer in rats induced by indomethacin belonging to nonsteroidal anti-inflammatory drugs (NSAIDs). Malondialdehyde and serum tumour necrosis factor- $\alpha$  were reduced by the extract of *M.maderaspatana*. Activity such as increase in reactive oxygen species, lipid peroxidation, infiltration of leucocytes, induction of apoptosis is induced in ulcer. Oral administration of extract of *Mukia maderaspatana* reduces ulcer with notable change in pepsin activity and free and total gastric values. Antisecretory drug such as RAN terminated Indomethacin-induced ulceration. RAN drug possess antioxidant, immunosuppressive actions and antiulcerogenic activity (Gomathy G et al., 2014).

#### Antibacterial activity

Harshiny et al. (2015) synthesized silver nanoparticles using leaf extract of *M. maderaspatana* and conjugate ceftriaxone. Results showed conjugated ceftriaxone with silver nanoparticles have better antioxidant and antimicrobial effect as compared to unconjugated nanoparticles. Riyazullah et al. (2010) conducted the study that showed soil and environment were major factors which have tendency to affect the activity of medicinal plants. They collected *M. maderaspatana* from India and Sri Lanka and tested their antibacterial and antifungal activity using different organic extracts and result proved that ciprofloxacin used as a standard for antibacterial activity and clotrimazole used as a standard for antifungal activity. Hemamalini and Varma, (2007) proved antimicrobial activity of methanolic leaf extract and petroleum ether extract and results showed that methanolic extract was more effective.

### 3. Conclusion

Plants are the most important source for exploring potentially useful structural compounds for developing new therapeutic drugs. In recent years, the use of natural herbal products has enhanced worldwide attentions. Many herbal products are claimed to assist in a healthy lifestyle. The present review study of pharmacological potential of *Mukia maderaspatana* shows the presence of active phytoconstituents possessing medicinal properties and reports the various pharmacological potentials which are explored by various researchers. *M. maderaspatana* is widely available in South India has been used to treat various diseases. Plants are widely used by human due to its chemical potential and eco-friendly nature for treating various disorders. Chemicals present in plant differ in structure, mechanism of action and biological properties. The active exploration of natural sources has provided new developments based on the understanding of complex mechanisms. Such exploration will lead to a safe and effective pharmacological treatment. Recent studies revealed that the plant possessing pharmacological activity, antibacterial, hepatoprotective activity, anti-inflammatory, anti-diabetic, gastroprotective activity, antioxidant activities. Eugenol is a secondary metabolite in *Mukia maderaspatana* possessing fly repellent activity

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