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A COMPREHENSIVE REVIEW ARTICLE ON MAJESTIC AND MIRACULOUS EFFECT OF *MUKIA MADERSPATANA*

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Abstract
Mukia maderaspatana (Linn.) M. Roem, belonging to the family Cucurbitaceae, is a climbing plant found predominantly in tropical and subtropical regions, especially in India and Sri Lanka. The species is rich in diverse phytochemicals, including alkaloids, flavonoids, tannins, saponins, steroids, terpenoids, cardiac glycosides, carbohydrates, and phenolic compounds. In traditional medical systems such as Siddha and Ayurveda, its leaves, roots, and fruits are valued for their wide-ranging therapeutic properties, functioning as stomachic, anti-ulcer, anti-inflammatory, antipyretic, diuretic, hepatoprotective, expectorant, carminative, anti-hyperglycaemic, anti-hyperlipidaemic, antimicrobial, antioxidant, and antirheumatic agents. This review highlights the medicinal importance of Mukia maderaspatana, consolidating its phytochemical profile and pharmacological activities to emphasize its potential as a natural therapeutic resource.

INTRODUCTION

Herbs play a major role in all traditional medical system especially in Ayurveda, Siddha, Unani, Homeopathy, Naturopathy and Chinese Medicine. The plants are possessing 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. Though the plants are mostly used as a functional green vegetable in cuisine among various communities for several centuries. Mukiamaderaspatana (L.) M. Roem.is a species of plant used for cooking and medicinal remedies. (Thabrew, M I et al., 1995, Jeyatilaka KAP, et al., 1990)

Figure 1
(Sathiavelu Arunachalam, 2019)

Cucurbitaceae family are generally called as gourds (Sugashini Settu & Sathiavelu Arunachalam, 2019). Plants are essential for surviving of human and providing food and medicine (Gomathy G et al., 2012). India follows a variety of medicine system such as Ayurveda, siddha, unani, naturopathy relying on the varieties of plants and originated from the ancestral ethnic group. Currently nutritional research focussing on the preventive medicine. The edible part of Mukia maderaspatana repeatedly consumed in dishes, savouries in South India (Petrus AJA 2013). The leaves and roots of musumusukkai are consumed as vegetables and also both ripe and unripe fruit also consumed (Rahman AHMM et al., 2006). The phytoconstituents of Mukia maderaspatana possess hepatoprotective, antirheumatic, diuretic, antiflatulent, antidiabetic, antiasthmatic activity (Gomathy G et al., 2012). The aerial parts of plants are also used for vertigo and biliousness (Moumita Banerjee & Thankamani V, 2013). Citrullus lanatus commonly known as watermelon belongs to Cucurbitaceae family, posses pharmacological activities due to presence of phytochemicals such as phenolic compounds, Flavonoids, terpenoids and also excellent source of micronutrients (Habibur Rahman et al., 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 AJA 2013). Industries relied with medicinal plants in field of cosmetic, food and pharmaceutical (Sugashini Settu &

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Figure 2
Refrence (shutterstock.com)

Botanical description

Mukia maderaspatana (Linn) Cogn. Agmuki 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 3
Image refrence (biolib.com)

Figure 4
(International Journal of Health Sciences, 4449-4459, 2022)

3.Plant profile

Kingdom: Plantae.	**Division: Sermatophyta**
Sub-division: Angiospermae	**Class**: Dioctyledonae
Sub-Class: Polypetalae	**Series**: Calyiflorae
Order: Passiflorales	**Family**: Cucurbitaceae
Genus: Mukia	**Species**: maderaspatana

4. Synonyms: Cucumismaderaspatanus (L.), Melothriamaderaspatana (L.) Cogn., Melothriaaltaeoides (Ser.), Mukiaalthaeoides (Ser.) (M. Roem.), Mukiarottleri (M. Roem.), Mukiascabrella (L.) (Arn.), Trichosanthesdioica (Wall.), Bryoniaalthaeoides (Ser.), Bryoniacallosa (Rottler.), Bryoniagracilis (Wall.), BryoniahispidaSalisb.), Bryoniamaderaspatana (L.), (Lam.), BryoniamicranthaHochst (Cogn.), Bryoniamicropoda (E.mey.), Bryoniarottleri (Spreng.), Bryoniascabra (Rottler.), Bryoniascabrella (L.)

English name: Madras pea pumpkin, rough bryony
Urdu; Bilari
Hindi: Aganaki, Agumaki, Bilari
Sanskrit: Musimusikkay
Malayalam: Chitrat
Kannada: Chitrati

5. Morphology
5.1. Leaves: Symmetrical ovate leaves, angularly shallowly to deeply 3-5 lobed, are 3-9 cm long. . (Veeramani, C et al., 2011)
5.2. Flowers: Yellow in color, 1 cm across, axillary, sessile clusters, calyx tube to 2 mm, villous; lobes subulate, erect, ovate-oblong, obtuse, petals 5, yellow, 3 mm long, stamens 3, free, inserted at base of calyx tube; anthers oblong, ciliate, female flowers solitary or in clusters, ovary villous, berry 1.2cm across, globose, red, seeds lenticular, rugose. (Veeramani, C et al., 2011)
5.3. Fruit: Pea-sized fruits are green, turning to orange and then red, as they mature. Hairs are present over the plant (Chopra, R.N., 2002; Kirthikar, K.R, 1980
5.4. Plant type Distribution: It is an annually monoecious herb It is globally distributed throughout the tropics and subtropics. It was found in India at hilly region and in Sri Lanka, mainly in Maharashtra, Kerala, Karnataka, and Tamil Nadu. It is a climber found in plain lands and in deciduous forests. (Petrus, A J A, 2012)
5.5. Harvesting and preserving: Fruits can be directly collected from wild. Season of collection Fruiting from June onwards. (McCullough, M L, 2012
5.6. Propagation: Flowering: July to September, : Seeds can be collected and sown in pots, allow them to germinate and plant in wild. (Rameshbabu, M P et al., 2004)
5.7. Method of storage: Seeds for cultivation Parts used unripe fruit Taste Potency(McCullough, M L, 2012

Figure 5
Refrence(shutterfood.com.un)

6. Medicinal uses: Leaf, root, stem, ripe fruit and root and leaf are used to treat fever, dyspnoea, abdominal disorders, hepatic disorders, cough and vomiting and the leaf decoction to treat HT and nasobronchial diseases. According to Gunapadam Mooligaivaguppu the leaves of Mukiamaderaspatana uses to treat cough, asthma, phlegm in lungs, productive cough, chest burning and rhinorrhea. The root uses in the treatment of male infertility, odor sputum in lungs, vomiting, gastritis, Pitha disease and indigestion. It may be a good remedy for male infertility, odor sputum in lungs, vomiting, gastritis, Pitha disease and indigestion while taking Korosanai with Mukia's leaf juice. (Murugesamuthaliyaar K S, 2018) Make adaiwith soaked red rice, Mukia's leaf and salt and it is useful in cough, phlegm and tuberculosis. Dry root powder or decoction of the root is good for vomiting and respiratory diseases. (Murugesamuthaliyaar K S, 2018) According to Siddha literature, the root and leaf powder is used to treat fever, dyspnea, abdominal disorders, hepatic disorders, cough and vomiting. The leaf decoction is given to hypertension and nasobronchial diseases. (Rameshbabu, M P et al., 2004) The Ayurveda medical system prescribes the leaves and root of Mukiamaderaspatanaf or Asthma, cough, burning sensation, dyspepsia, fltulance, colic, constipation, ulcer, neuralgia, nostalgia, odontalgia and vertigo. (Warrier, P K et al., 1995; Ved, D K et al., 2002) The fruit is used in dysuria, polyuria, piles and tuberculosis. (Pandey, G, 1994; Lather, A et al., 2011) The studies reveal the bioactive phytochemicals of the plant reduce the risk of cardiovascular diseases. (McCullough, M L, 2012; Vauzour D, 2010)

Other than Cardiac diseases it also used to treat cancer, obesity, Diabetes and allergic conditions. The leafy- vegetable, Mukiamaderaspatana has anti-diabetic and vasoprotective potentials. (Petrus, A J A, 2012) The leaf extract also used to treat tooth-ache, vertigo and biliousness (Chopra, R.N., 2002; Kirthikar, K.R, 1980). Tea prepared from leaves and bark is act as decongestant and given to cure cough, cold, flu and also for jaundice too. Toothache can be cured while masticate the seeds and crushed seeds can be applied on body and back for relief pain. (Kirthikar, K.R, 1980) Thiobarbituric acid in leaf extract reveals antioxidant activity. The phenolic compound in the extract has antihypertensive, anti-diabetic and antioxidant capacities. (Veeramani, C et al., 2011)

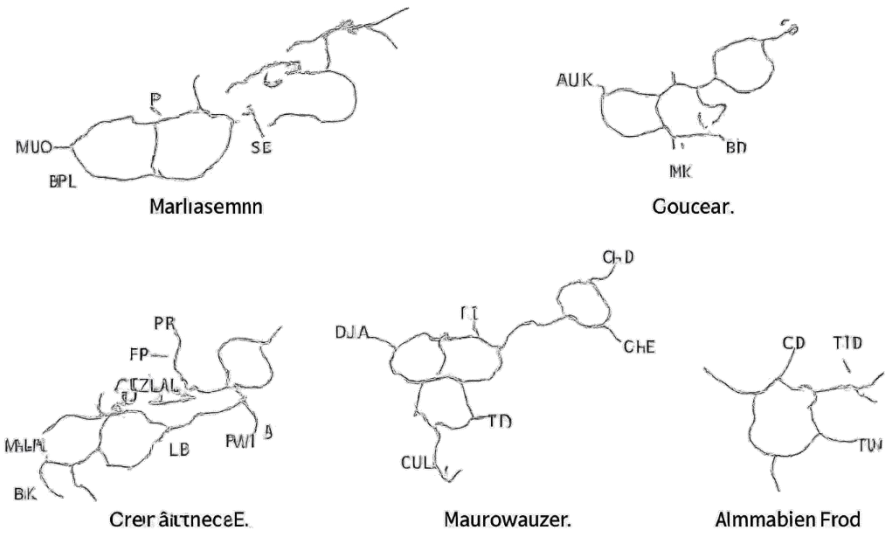
Figure 6
Image refrence (pixle lab .com)

It is one of the ingredients in Ayurvedic preparations like Pipalyasava, Rasayanarishta, Srikandasavaand Manasamitravadaka maccording to the descriptions in Sarngadhra Samhita, Bhaishajya Ratnavali, Kadhanikragam, Yogaratnagaram and Sahasrayaham. It is a main ingredient in Asthacure, Asthmex, Bronkease, Respease and Musumusukkaichooranam which are retail in Indian Ayueveda shops, for treating bronchial asthma, allergic bronchitis, chronic bronchitis, bronchiectasis, productive cough and cold, upper and lower respiratory tract infections and difficulty in breathing. (Jain, S P et al., 1994; Deshpande, D J et al., 2006) The active ingredient of Siddha preparation Kaphamarunthu is Mukia leaves. (Chithravadivu, C et al., 2009)

Figure 8
Image refrence (Bio lib. Com)

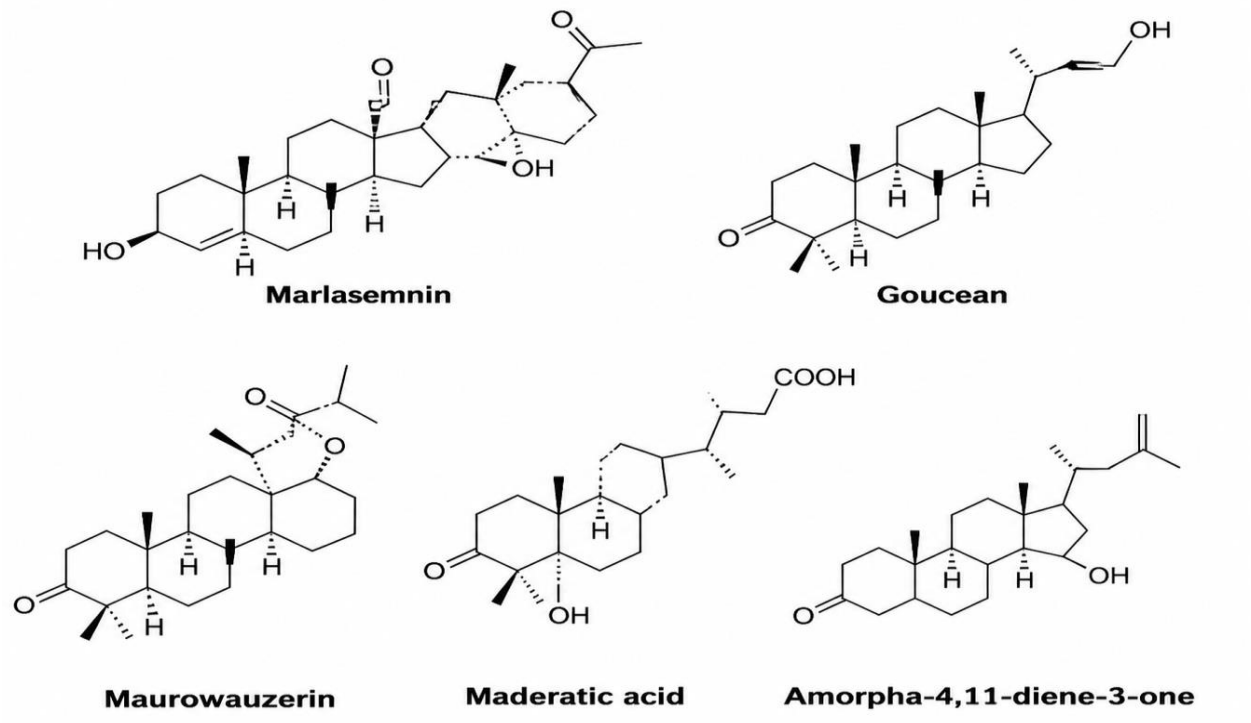
7. Chemical constituents

Previous phytochemical studies using GC-MS analysis on Mukiamaderaspatana revealed the presence of alkaloids, flavonoids, tannins, saponin, steroids, terpenoids, cardiac glycerides, carbohydrates, phenolic compounds. (Thabrew, M I et al., 1995)The leaves contains mainly 2 Methylthiolane,S,Sdioxide, Diazeene, bis(1,1-dimethylethyl),3 Buten-2-ol,2-Butyn-1ol, 4-methoxy, Dichloroacetic acid, 4 methylpentyl ester,2(Chloromethyl)-2-3-dihydro-4(1H)-quinolinone, Pantolactone compounds. Most of these phytochemicals plays as antimicrobial activity. (Gomathy,G et al., 2012) Another study revealed the presence of eugenol in the plant extract is response for the antioxidant activity, inhibit the lipid peroxidation and prevent cardiac diseases. (Gupta, S K et al., 2002) The whole plant contains saponin use to controlling cholesterols in human body. (Xu, R et al., 1996) The plant has tannin and has been extensively studied in control to antidiarrheal, hemostatic and antihemorrhoidal activity. Tannin 38293 | P a g e International Journal of Recent Scientific Research Vol. 11, Issue, 04 (E), pp. 38292-38296, April, 2020 38294 | Page also shows antiviral, antibacterial andantiparasiticactivities. (Lin, L U et al., 2004; Akiyarma, H et al., 2001; Kolodziej, H et al., 2005



Glepier. vegianagrapaens Cinevononee

8. Pharmacological activities: The plant was reported thatstomachic, anti-ulcer, antiflatulant, antirheumatic, anti-inflammatory, anti-microbial, antipyretic, diuretic, antiasthmatic, antibronchitis, antidiabetic, hypolipidemic, hypotensive, aperient, anti-platelet aggregation, immunomodullatory, anxiolytic, local anesthetic, chemo protectiveand hepatoprotectiveare the pharmacological activities of Mukiamaderaspatana. (Ramakrishnamacharya, C.H et al., 1996; Thabrew, M I et al., 1995, Petrus A.J.A, 2012) According to Ayurveda, the plant has expectorant, refrigerant, carminative, aperient, sudotific, anodyne and tonic. (Warrier, P K et al., 1995; Ved, D K et al., 2002) Anti-hyperglycaemic activity Aerial part of Mukiamaderaspatana contains ethanol having insulinotropic activity. It reduces the serum glucose level and increases the glycogen formation. (Vadivelan, R et al., 2010)It reduces the endogenous glucose output from the liver and increases the glucose uptake by skeletal muscles. (Kaur, M et al., 2009) The extract marks glucose tolerance equal to metformin. (Balaraman, AK et al., 2011) On other hand α amylase, α-glucosidase in extract inhibits the starch decomposition.**(Vadivelan, R et al., 2012)**



Chemical constituents of Mukia maderapatana

Dengue fever is the most common mosquito-borne viral disease in the world, caused by the dengue viruses (DENV 1–4) and it was transmitted in Malaysia by two main Aedes mosquito species: Aedes aegypti and Aedes albopictus. The overuse of synthetic chemical insecticides in managing these vectors leads to an increase in insecticide resistance, which has occurred in most arthropod species, including Aedes mosquitoes. Bio-insecticides have been suggested as a new potential alternative method which can replace synthetic chemical insecticides to overcome the vector issues. Analytical data were used to compare with Malaysian plants that have larvicidal ability; and those plants were Areca catechu, Azolla pinnata, Lantana camara, Mukia maderaspatana, and Leucas aspera. The most prevalent chemical components found in all (internationalhub.com) five plants were fatty acids (oleic acid, palmitic acid, tetradecanoic acid), fatty acid methyl esters (hexadecanoic acid methyl ester, 9-octadecenoic acid (Z)-methyl ester), and flavonoids (catechin). These chemical compounds have been patented for pesticide formulations due to their biodegradable qualities and capacity to increase pesticide efficiency. Furthermore, the key advantages of these chemical compounds to combat vector difficulties are their enzyme inhibitory characteristics, biochemical alterations, and structural deformation of mosquito larvae. According to the findings of this study, these five plants have the potential to be used as bio-insecticides.(Vadivelan, R et al., 2012)

Figure 10.
Refrence (shutter stock)

Mukia maderaspatana (L.) M. Roemer – a review of its global distribution, phytochemical profile and antioxidant capacity..Mukia maderaspatana (Linn.) M. Roemer, (family: Cucurbitaceae) is a wild functional food plant, traditionally used for human consumption by various cultures. Indigenous communities around the world utilize various parts of the plant to alleviate a number of human and livestock ailments. For the first time, this review attempts to critically assess the global distribution and vernacular names as well as the phytochemical profile and the antioxidant capacity of this potentially medicinal taxon.(AJA Petrus)

Peptic ulcer disease (PUD) is a serious gastrointestinal disorder that requires a well targeted therapeutic strategy. So many number of drugs including H2 receptor, antacid and proton pump inhibitors are available for the treatment of peptic ulcer, but clinical evaluation of all these drugs has shown incidence of relapses and side effects. This has been the rationale for the development of new antiulcer drugs and the search for novel molecules has been extended to herbal drugs that offer better protection and decreased relapse. Plant drugs are gaining popularity and are being investigated for various of disorders, including peptic ulcer. Even there are so many herbal remedies for ulcer. The present investigation reviews the antiulcer property of ethanolic extract of root of Mukia maderaspatana in ethanol induced ulcer models in wistar rats. The parameter determined was Gastric volume, Ulcer score, pH, Na+, K+, Free acidity, (bilto tin linn 2018)Total acidity, Pepsin, Total protein, Total carbohydrates and Carbohydrate protein ratio.

Ethanolic extract of root of M. maderaspatana at doses of 100, 200, 300 mg/kg (body weight) produced dose dependent inhibition of the gastric lesions induced by ethanol. The extract (300 mg/kg) showed significant ($P<0.01$) gastroprotectivity activity, which was compared with the standard drug Ranitidin (150 mg/kg). (cabidigitallibrary.org)

Figure 11
Image refrence pixle lab

8.1. Anti-hyperlipidaemic activity

Aqueous extract of the dried aerial part of the plant shows the reducing effect in serum lipid level. It reduces the TC, TG, LDL, VLDL, PL and increases the HDL. Though this plant can be used in coronary and atherosclerotic heart diseases. (Pandey, D et al., 2010)

8.2. Anti-hypertensive activity

Hypertension is one of the risk factors for atherosclerosis and causes cardio vascular diseases. Hypertension may be caused stroke or coronary heart diseases in the subjects. A previous study stated ethanol in leaf extract reduces both systolic and diastolic pressures. (Veeramani, C et al., 2011)Coumarin in leaf extract also has hypotensive activity. (Petrs AJA, 2012) The leaf tea is prescribed for 45 days who have uncontrolled systemic hypertension, it can reduce both systolic and diastolic pressures. (Raja, B 2007)

Hypertension is a common factor for cardiovascular disease and major cause for disorders such as strokes and coronary heart disease (Chinnadurai Verramani et al., 2010). It is a condition in increase in pressure in blood vessels with elevation more than 140 mmHg in (SBP) and

90 mmHg in (DBP) (Bhavika D., et al 2020). In hypertensive animals ROS are elevated and results in convertion of oxygen to hydrogen peroxide. Ethanolic extract of Melothira maderaspatana proved antihypertensive activity in in-vivo study on male albino wistar rats induced with DOCA-salt (Chinnadurai Verramani et al., 2010). Relaxation of aorta endothelium of rat is caused by leaf extract of M.maderaspatana in in-vitro study (Boobalan Raja et al., 2007). Significant decrease in levels of systolic and diastolic blood pressure is seen in animals treated with MME. Studies on phytochemicals shows that the phenolic constituents possess antioxidant and antihypertensive activity.

Free radical scavenging activity is seen in extract of M.maderaspatana.Coumarine belongs to family of triterpene possessing pharmacological activity such as anti-clotting and anti-inflammatory activities. Increase in intake of antioxidants results in reduction of oxidative stress and preventing from cardiac and renal disorder. Ethanolic extract of Melothira maderaspatana significantly increases the level of enzymatic and non-enzymatic antioxidants (Chinnadurai Verramani et al., 2010).

Figure 12
Refrence (pharmacokinetics.com)

8.3, Hepatoprotective activity

Methanol in the root extract acts as a good heptotonic and decrease the increase SGOT, SGT and ALT. (Balaraman et al., 2010) So, the previous studies prescribe Mukia in the diseases. (Thabrew, M I et al., 1995, Jeyatilaka KAP, et al., 1990)

Albino rat liver is protected from carbontetrachloride (CCI4)-induced damages by Aqueous extract of aerial parts of M.maderaspatana. Histopathology reports Significant improvement in CCI4-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).

Figure13
Refrence (biolib.okay)

8.4. Antioxidant activity

Phenolic compounds in leaf extract possess antioxidant activity. Flavonoids in Mukiamaderaspatana also have antioxidant capacity and reduce the incidence of cardio vascular diseases. (Petrs AJA, 2012)

Antioxidants protects the body from free radicals possessing radical scavenger property (Rekha Rajendran et al., 2010). Oxidative stress is a imbalance between pro-oxidants and antioxidants. Oxidative stress leads the body to disease 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.
Antioxidant Potential of the extract of whole plant parts of Mukia maderaspatana (linn.) RoemK Ramachandran, R Venketnarayanan (International Journal of Biological & Pharmaceutical Research 10 (1), 1-14, 2019)
Oxidative stress induces a cellular redox imbalance which has been found to be present in various cancer cells compare with normal cells, the redox imbalance thus may be related to oncogenic stimulation. Lots of anticancer drugs are in the market, but the main problem associated with these drugs is their side effects. Because of chemotherapy treatment side effects, the patient needs secondary palliative care treatment. Plant medicines are well known for their non-toxic side effects, so the objective of the study is to develop a drug from medicinal plant against colon cancer with non-toxic side effects. In the present study, Mukia maderaspatana (Linn.) Roem was used to study the Antioxidant potential of the extract and to synthesize new anticancer moiety. DMP was also studied for its in vitro antioxidant property by different methods. DMP has a hydrogen donating property, which may be attribute to the good antioxidant activity.
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)

.8.5. Immunomodulatory activity

In-vitro study shows the aqueous extract of whole plant has immunomodulatory effect in both classical and alternate pathway in the complementary system of the human being. (Thabrew, M I et al., 1995)

8.6. Anti-inflammatory activity

In previous study reveals methanol in leaves extract has anti inflammatory activity and it made a significant mild to moderate improvement in the symptomatic parameters and laboratory parameters without no adverse effects. It has also played as anti-rheumatic activity. It is good in rheumatoid arthritis management. (Ramakrishnamacharya, C H et al., 2010)
Inflammation is caused by the denaturation of protein. The M.maderaspatana Extract shows positive effect on inhibition of protein denaturation and proteinase Activity. Proteinase activity is inhibited by extract of M.maderaspatana. The Inhibitory effect on protein denaturation and proteinase activity 2. 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).

8.7. Anti-platelet aggregation activity

Flavonoids of plant extract inhibits platelet aggregation and re establish the equilibrium between pro-aggregating and anti aggregating factors. This phytoconstituent reduces the atherogenic changes and prevent HT, Stroke, and myocardial infarction. The flavonoid replicates 50% of aspirin. (Iman, R A et al., 2006)

8.8. Anti-microbial activity

Ethanol extract eliminates the microorganism of bacterial and fungal. The extract fights against Staphylococcus aureus, Streptococcus pyogens, Escherichia coli, Pseudomonas aerigionosa, Salmonella typhimurium, Staphylococcus epidermidis, Staphylococcus subflavaand Staphylococcus subtilis. C, it has anti-fungal activity against Candidiatropicalisand Trichophytonrubrum. The plantextract is a good source for inhibit the bactria and fungal proliferation. (Parekh, J et al., 2008; Hemamalini K, 2007)

8.9. Anti-ulcer activity
Crude aqueous suspension of dried leaves indicates antiulcer activity. It is mostly effective in stress induce ulcer. (Dhanaraj, T S et al., 2012)

8.10. Anxiolytic activity
Alcoholic extract of leaves has sedative action and this phytoconstituent acts similar to diazepam. Flavonoid, saponin, tannin in the extract have anxiolytic activity and especially for CNS disorders. (Saravanan S et al., 2012)

8.11. Local anesthetic activity
Ethanol in air dried leaves has mild anesthetic activity. (Sarojini, S et al., 2008)

8.12. Anti-convulsant activity
The leaf juice has anti-convulsant property, has anxiolytic, analgesic and antidepressant activities prescribes for seizure. (Quintans, I J et al., 2008)

8.13. Antidiabetic activity figure 15 refrence(shutter stock)
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 α-glucosidase and α-amylase that are responsible for digestion of carbohydrates. The active inhibitory effect is performed by flavonoids, terpenes and phenolic compounds. Type 2diabetes 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

8.14 .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-α 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).

8.15. Anthelmintic activity

Mukia maderaspatana belongs to consumable leafy crop possessing anthelmintic Activity. Anthelmintic activity of ethanolic and aqueous extract of whole plant of Mukia maderaspatana proves in in-vitro study on Pheretima posthuma with the Standard drug Albendazole. In comparison aqueous extract shows more Anthelmintic activity than ethanolic extract by estimating parameters such as Time for paralysis and death time. Mechanism of anthelmintic activity proved by Mukia maderaspatana due to presence of phytochemical such as tannin and Alkaloids. Alkaloids are responsible for paralysis of Pheretima posthuma by acting On central nervous system. Tannin intrusion in generation of energy by Uncoupling oxidative phosphorylation (Lavanya M et al., 2013).

8.16. Antimitotic activity

Figure 14.
Refrence (biolib)

The leaf acetone extract of Mukia maderaspatana proved antimitotic activity in Allium cepa root model (Kavitha M et al., 2014). Meristematic cells undergo rapid division similar to metastasis of cancer in human. Preliminary screening of drug from Allium cepa possess anticancer activity (Katolkar P.P et al., 2012). The EC50 value of leaf acetone extract is 10 mg/ml. In cell cycle study changes in chromosomes were observed. Inhibition occurs in various stages of cell cycle ofmeristematic cell by leaf acetone extract. Apoptosis occurs due to DNA fragmentation and also inhibited the synthesis of DNA. Polyphenolic phytoconstituents of Mukia maderaspatana such as phenols and tannins possess antimitotic activity (Kavitha M et al., 2014).

8.17.Anticancer activity

Cancer is known as hyperproliferative disorder. Chronic hepatitis B virus is the risk factor for liver cancer (Dr. Julius.A et al., 2017). Cancer caused by factors like exposure to toxic chemicals, external environment, diet and unhealthy living. Treatment, control and survival of cell includes the management of cancer (Amaq Fadholly et al., 2020). Antioxidant like Beta carotene protects body from free radicals that is responsiblefor diseases like cancer. The invitro cytotoxic activity performed on MCF-7 cell line with the methanolicextract of Mukia maderaspatana and proves it with an IC50 value as 32 µg/ml. MTT[3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide] assay is performed to evaluate the inhibitory concentration (IC50) value. The methanolic extract of Mukia maderaspatana exhibits suppressive effect by dose dependent on cell proliferation. The results of Mukia maderaspatana on MCF-7 cells is similar to the anti-proliferative effect of Ganoderma lucidum against MCF-7 cells by alcoholic extraction (Suganthi A & Mary Josephine R, 2017)

Figure
Image refrence (hubco.pk)

Image reference (medtheta.com)

10.Conclusion

Mukia maderaspatana (Linn.) serves not only as a traditional food source but also as a rich reservoir of bioactive compounds. Phytochemical studies have identified alkaloids, flavonoids, tannins, saponins, steroids, terpenoids, cardiac glycosides, carbohydrates, phenolic compounds, as well as essential minerals like iron, phosphorus, and copper, along with vitamins C and E, and dietary fibers. Isolation and analysis of these constituents reveal significant medicinal potential, many of which are already applied in therapeutic practices. In Siddha medicine, the plant is valued for its stomachic, anti-ulcer, antiflatulent, anti-inflammatory, antipyretic, diuretic, and hepatoprotective properties, while Ayurveda emphasizes its expectorant, refrigerant, carminative, aperient, sudorific, anodyne, and tonic effects. Recent pharmacological investigations further highlight its anti-hyperglycaemic, anti-hyperlipidaemic, antimicrobial, antioxidant, anti-inflammatory, and antirheumatic activities.

The leaves, roots, and fruits are traditionally employed in treating respiratory conditions (cough, asthma, tuberculosis, rhinorrhea, dyspnea), gastrointestinal disorders (gastritis, constipation, indigestion, abdominal pain), hepatic dysfunctions, male infertility, fever, vertigo, and other systemic ailments. Moreover, its therapeutic relevance extends to chronic diseases such as diabetes, cancer, obesity, hypertension, and cardiovascular disorders.

This review demonstrates the broad pharmacological potential of *Mukia maderaspatana*, driven by its diverse phytochemical profile. Continued exploration of natural sources like this plant offers new insights into complex biological mechanisms and paves the way for safe and effective pharmacological interventions.

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