



A REVIEW ON THE MILLINGTONIA HORTENSIS L. Fil

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ABSTRACT

Medicinal plants play a vital role in improving health of people. Hundreds of medicinal plants have been used to cure various diseases since ancient times. Millingtonia hortensis (Bignoniaceae) is commonly known as cork tree & Akasha neem. The phytochemical (secondary metabolites) screening of menthol, chloroform, ethanol, petroleum ether, aqueous leaf extract revealed in the presence of carbohydrates, alkaloids, tannins, saponins, flavonoids, betacyanins, phenols & coumarins. Millingtonia hortensis Linn is cultivated in most parts of India, both in gardens and avenues. Tall and straight, with comparatively few branches, its popularity lies in its ornamental value. It is a fine tree, fast growing, but with brittle wood, liable to be damaged by storms. In favourable positions it can grow to 24 m tall. The ashy bark is cracked and furrowed and the numerous fissures make removal of the cork an easy matter. It is used as an inferior substitute for true cork From April until the rains and again in November and December, a profusion of silvery white, delightfully fragrant flowers crown the foliage. Upright open clusters with arching blooms terminate every branchlet. Each flower is a tiny bell-shaped calyx, a long slender tube of palest green dividing into four waxy, white petals and several conspicuous yellow anthered stamens. Many flowers are delicately tinted with rose. As the flowers are short-lived, the flower sprays mostly consist largely of long whitish buds, while the ground below is spangled with innumerable little stars. Between January and March the leaves are shed and renewed during April and May, although the tree is never quite naked. Trees do not seed very easily in India.

KEYWORDS: Millingtonia hortensis (Bignoniaceae) is commonly known as cork tree & Akasha neem.

INTRODUCTION

Medicinal plants play a key role in healthcare and about 80% of the world's populations rely on the use of traditional medicine.^[1,2] Phytochemicals are primary and secondary metabolites of plants which fight to protect our health against diseases. Phytocompounds commonly found in plants have been reported to have multiple biological effects including antioxidant activity. In recent years. Secondary plant metabolites (phytochemical) previously with unknown pharmacological activities have been extensively investigated as a source of medicinal agents.^[3] The secondary metabolites like phenolics and flavonoids from plants have been reported to be potent free radical scavengers and thus act as antioxidants.^[4]

Antioxidants reduce the oxidative stress in cells and are therefore useful in the treatment of many human diseases including cancer, cardiovascular diseases and inflammatory diseases. It is believed that high intake of antioxidant-rich food is associated with decreased risk of degenerative diseases, particularly cardio vascular diseases and cancer.^[5] The synthetic antioxidants (e. g

butylated hydroxyl anisole (BHA) butylated hydroxyl toluene (BHT) or vitamin E.^[6-7] are commonly used. These synthetic antioxidants such as butylated hydroxyl anisole (BHA) butylated hydroxyl toluene (BHT) etc. may have carcinogenic and other harmful effects on the lungs and liver^[8-9] of human beings. Scientists have continuously engaged in the search for naturally occurring potential and non-toxic antioxidants which could prevent free radical related disorders in human beings and also can replace the harmful synthetic antioxidants.^[8-9]

Plant derived antioxidants have advantages as they are less toxic and more effective and economical and hence there is a growing interest in identifying natural antioxidants of plant origin.^[10] The search for cheap and abundant sources of natural antioxidants is attracting worldwide interest.

A very tall and straight tree with brittle wood and liable to damaged by storms. It can grow up to 25 meter tall and it can reach 80 meter in height. Flowers have very rich and pleasant scent. In Thailand, the flower is called

“peep’ and compounds. Many of these indigenous medicinal plants are also used for medicinal purposes. In recent years, use of antimicrobial drugs in the treatment of infectious disease has developed multiple drug resistance and with increase in production of new antibiotics, by pharmaceutical industry, resistance to these drugs has also increased. used for the treatment of asthma, sinusitis and as a cholagogue and tonic. The flowers are also used in rituals and have good antimicrobial properties. The stem has brittle wood and liable to damaged by storms, stem bark is used traditionally as mainly lung tonic, antiasthmatic and antimicrobial properties. Leaves and roots of cork tree used as antiasthmatic and antimicrobial activity. Fruit is very long and narrow, pointed at both ends and contains thin, flat seeds. Trees do not seed very easily in India. Roots can be used for the treatment of tuberculosis and

as an antiasthmatic. The leaves of Cork tree are very ornamental and extracts of leaves has good antimicrobial activity. The leaves of *Millingtonia hortensis* are used as antipyretic, antiasthmatic, sinusitis, cholagogue and tonic in folklore medicine”.^[11]

PLANT PROFILE

CLASSIFICATION

KINGDOM: Plante

DIVISION: Magnoliophyta

CLASS: Magnoliopsida

ORDER: Lamiales

FAMILY: Bignoniaceae

GENUS: *Millingtonia*

SPECIES: *hortensis*

CLADE : Tracheophytes

Angiosperms.



Fig. Flower Bunch.



Fig. Petals.



Fig. Anther & Flower



Fig. Flower Bud.



Fig. Leaf .



Fig. Leaves.



Fig. Flower.



Fig. Anther.



Fig. Tree.

Dig. Parts of Millingtonia hortensis.**SYNONYMS**

Bignonia azedaracta Kon. & Sims, *Bignonia cicutaria* Koen. ex Mart., *Bignonia hortensis* (L. Fil.) Oken, *Bignonia suberosa* Roxb., *Millingtonia dubiosa* Span., *Nevrilis suberosa* Raf.

COMMON NAME/VARNACULAR NAME

ENGLISH: Indian Cork Tree.

HINDI: Neem Chameli.

KANNADA: Akasha mallige.
Biratamara.

KOKANI: Akasnimb

MALAYALAM: Katesam

MARATHI: Akash Changli

Buch Tree

Kavel Nimb

ORIYA: Bakeni

TAMIL: Kat-malli

TELAGU: Kavaki

OTHER: Corckumaram

Kattumalli

Maramalli

Tree Jasmine

MORPHOLOGICAL CHARACTERISTICS

Millingtonia hortensis L.F.

Binomial

Tree: Tall, Fast growing flowers bloom at night & shed early morning wood is brittle.

Bark: yellowish, thick & relatively fragrant.

Flower: white, waxy, trumpet – shaped fragrant.

Flowering period: mostly in October to December.

Pollinators: India Burma, Malaysia, southern Asia Thailand and Southern China.

The cymes are terminal 25 cm in diameter. The inflorescence axis & pedicel of *Millingtonia hortensis* are light yellow pilose, bracts & fall prematurely; pedicels are thin, about 1cm long. The calyx is tiny, cup shaped, 2-4 mm long & wide, shallowly wavy, 5 lobed, & the lobes slightly reflexed.

DISTRIBUTION AND CULTIVATION

Millingtonia hortensis is an important medicinal plant in Southern Asia from India, Burma Thailand and South China. The trees indigenous to Burma and the Malay Archipelago, but grows wild in most parts of India as well as being extensively cultivated.

The tree is cultivated in various parts of India for its ornamental purpose they can grow up to 25 m with woody stem and thick cork. The sole species in the genus *Millingtonia hortensis* is a tree native to South Asia. The name *Millingtonia hortensis* comes from Thomas Millington, an English Botanist while *Millingtonia hortensis* means "Grow on a Garden".^[12]

PHARMACOGNOSY**MACROSCOPIC CHARACTERS**

Leaves: The leaves are large, two to three pinnate and the leaflets are shiny, dark green and with toothed edges. They are arranged in opposite fashion on the stem 0.6 to 0.9 m long and pinnately compound with odd number of leaflets. Each leaflet is ovate lanceolate in shape 5 to 7 cm long with a short stalk and has smooth or slightly wavy margins. Drug occurs in 6-20 cm long, 0.3-0.5 cm thick cut pieces almost cylindrical internodes, smooth, stout, mostly covered with shining sheath having distinct nodes, brownish yellow, a few thin fibrous, ash colored roots at nodes. The leaves give no odor and are slightly bitter in taste.^[13]

Stem bark: It is dark brown colored and characteristic odour. Stem has brittle wood and liable to damaged stems. The inferior cork is processed from its corky bark. Externally rough with irregular ridges.^[16,17]

Flowers: Flowers are white and stand out particularly against the dark green foliage they open at night and are delightfully scented.

FRUIT: Fruits are very long and narrow pointed at both ends and contain thin, flat seeds.^[14]

Stem bark: The transverse section of stem bark shows epidermis with 2-3 layered tangentially elongated cells surrounded by cuticle. It shows cortex consisting of 25 to 30 rows of parenchymatous cells along with lignified

medullary rays at one side in parenchymal Cells. It shows phloem, xylem, pith and sclerenchyma

respectively".^[15]

Phytochemical Constituents

Sr. No.	Phytochemical constituents	Present/Absent
1.	Carbohydrates	Present
2.	Reducing sugar	Present
3.	Coumarins	Present
4.	Glycosides	Present
5.	Amino acids	Present
6.	Steroids	Present
7.	Proteins	Present
8.	Alkaloids	Present
9.	Flavonoids	Present
10.	Terpenoids	Present
11.	Phenols	Present

PHARMACOLOGY

1. Antibacterial Activity: The polar extracts of the leaves of *M. hortensis* showed good antimicrobial activity Twenty different bacterial strains and two yeast cultures were used The aqueous alcohol extract showed good activity against all microbes tested particularly against *Escherichia coli* and *Salmonella typhimurium* Both Gram-negative bacteria with MIC values of 6.25 pg/ml. The activity is compared with known antibiotics such as gentamycin and nystatin".^[18] The essential oil of flowers extracted by using vapor distillation with 05-2% yield, tested against various species of bacteria like 4 gram-positive bacteria (*S.aureus* ATCC25923, 5 *epidermidis* ATCC12228, 8 *subtilis* ATCC6633 and *L. Plantarum* ATCC14917) and 2 of gram negative bacteria (*Ecoll* ATCC25922 and *Pvulgaris* ATCC13315). In this study. *M hortensis* Linn, essential oil of flower showed broad spectrum antimicrobial activity at low Concentration".^[19]

2. Anticonvulsant Activity: The functional characterization of hispidulin (4, 5, 7- trihydroxy-6-methoxyflavone), a potest benzodiazepine (BZD) receptor ligand, was initiated to determine its potential as a modulator of central nervous system activity After chemical synthesis hispidulin was investigated at recombinant GABA/BZD receptors expressed by *Xenopus laevis* oocytes. Concentrations of 50 nm and higher stimulated the GABA-induced chloride currents at tested receptor subtypes (α-3, 5,682y25) Indicating positive allosteric properties Maximal stimulation at αβ2y25 was observed with 10 μM hispidulin. In contrast to diazepam, hispidulin modulated. The α6225-GABA receptor subtype. When fed to seizure-prone Mongolian Gerbils (*Merionesun guiculatus*) in a model of epilepsy, hispidulin (10 mg kg bw/day) and diazepam (2mg Kg bw/day) markedly reduced the number of animals suffering from seizures after 7 days of treatment (30 and 25% of animals in the respective treatment groups, vs 80 % in the vehicle group) Permeability across the blood-brain barrier for the chemically synthesized, 14cs-labelled hispidulin was confirmed by a rat in situ perfusion model.^[20]

3. Antifungal activity:- Antifungal activities of different extracts of *M. hortensis* were investigated against various fungal pathogens Methanol extract was found to have stronger activity than fluconazole against yeast like fungi: 4 fold against *Candida krusel* with 4pg/ml minimal inhibitory concentration and 2 fold (MIC-2 pg/ml) against *Saccharomyces cerevisiae*, though it showed the same activity as fluconazole against *Candida glabrata*. Aqueous extract also exhibited 4 fold stronger activity against *Candida krusel* (MC-4 μg/ml) and 4 fold (MIC 2 pg/ml) against *Saccharomyces cerevisiae*. Chloroform and ethyl acetate extract showed lower activities against all fungal Pathogens except for *Candida krusei*. Compared with the standard. Against the filamentous fungus.^[21]

Antifungal activity of aqueous extracts of leaves of *Millingtonia hortensis* Linn. When tested against eight fungal species of maize at 10, 20, 30, 40 and 50% concentration showed maximum activity against *A flavus* at 50% concentration followed by *F. oxysporum* (90.2%). *F. solani* (89.5%), *F. moniliforme* (87.7%). *A candidus* (78.9%), *A. niger* (78.0%), *A flavipes* (73.2%) and *F graminearum* (52.1%) at 50% concentration tested. Moderate activity was also observed in 20, 30 and 40% concentration and least activity was observed in 10% concentration tested Compared to synthetic fungicide bavistin and thiram, both the fungicide recorded 100% inhibition.^[22]

4. Anti-Phlogistic Activity: Hispidulin, a bioactive flavonoid isolated from the flowers of *Millingtonia hortensis* Linn F., was tested for anti phlogistic effect by observing the inhibitory activity in 5- lipoxygenase pathway. The test was performed by incubating the hispidulin with 1-^[23] "C-arachidonic acid and porcine leukocyte suspension containing 5-lipoxygenase After the incubation, the 1^[23] C-arachidonic acid and its metabolite were separated and quantified by RP-HPLC Hispidulin showed inhibition of 65% at 64 M".^[24]

5. Antioxidant Activity: The antioxidant activity of aqueous extract of *Millingtonia Hortensis* Linn. Stem

bark studied by various methods Both the extract and standard drug quercetin were evaluated for its antioxidant potential at 10, 20, 30, 40 and 50 µg/ml. In addition the amount of total phenol (241 mg/gm) and total flavonoid (172 mg/gm) were determined. The extract showed its antioxidant potential DPPH radical scavenging activity (IC₅₀ 29.05 µg/ml, FRAP radical scavenging activity, DCF/AAPH assay (TRAP) (IC₅₀ 41.10 µg/ml, ABTS scavenging activity (IC₅₀ 24.0 µg/ml). superoxide anion scavenging activity assay (C₅₀ 26.0 µg/ml) and Nitric oxide assay (IC₅₀ 31.0 µg/ml). The present study depicts that Millingtonia hortensis Linn bark has a potential natural antioxidant that can be used as a supplementary drug for various ailments "Antioxidant and hepatoprotective activity. The hepatoprotective and antioxidant potential of Ethanolic extract of Millingtonia hortensis on carbon Tetrachloride(Cl) induced hepatotoxicity Investigated, phytochemical studies were carried out to Determine the total phenol and flavonoid contents 30 Adult wistar rats were allocated into 5 groups. Control Group received vehicle, group-2 received Cel, alone (1ml/kg body weight, intraperitoneally group 3.5 Received the ethanolic extract in 2 dose line poed 400 mg/kg) and curcumin (100mg/kg) as a standard for B days orally, followed by Ccl, as a single dose on the a day 48 hours later, blood was withdrawn, serum was subjected to biochemical assessments and liver homogenate was examined for lipid peroxides glutathione, superoxide dismutase, catalase and total protein levels. Furthermore, hepatic tissues were subjected to histopathological studies. Cel, treatment produced a profound increase in the level of malondialdehyde, hepatic marker enzymes and bilirubin content compared with the control (p<0.05) Pretreatment with the flower extract of Millingtonia hortensis significantly enhanced the level of endogenous antioxidants and reduced the levels of hepatic marker enzymes in relation to the Ccl, treated group (p<0.05). Balloning degeneration and fatty changes in hepatocytes.^[25]

6. Antiasthmatic Activity: The methanol extract exhibited bronchodilating effect on isolated rat trachea, this extract was further fractionated. Into petroleum ether, chloroform, n-butanol and aqueous fractions Pharmacological studies indicated that the chloroform fraction elicited the most prominent effect. Further separation of the chloroform fraction by short column chromatography enabled hispidulin, the bronchodilating agent, to be isolated Detection by TLC indicated that hispidulin is one of the compounds present in the smoke of the dried flowers. It is therefore kely that the antiasthmatic activity of the dried flowers of M hortensis Linn is due to hispidulin Hispidulin is more potent than aminophylline on a molar basis It was interesting to observe that the aqueous extract of these flowers exhibits a bronchoconstricting action which gradually diminishes upon storage.^[27]

7. Antihelminthic Activity: The present study was undertaken to evaluate anthelmintic activity of different extracts (petroleum ether, Benzene, chloroform, methanol and aqueous extracts) of stem bark of Millingtonia hortensis (Bignoniaceae) against adult earthworm Pheretima posthuma Piperazine citrate was used as standard reference drug. Among all the extract tested, methanol showed dose dependent anthelmintic and better activity in comparison with reference standard. Chloroform and benzene extracts at 20 mg/ml concentration also showed similar activity in comparison with piperazine citrate at Dose of 60 mg/ml. Aqueous extract was not at all active.^[26]

CONCLUSION

Medicinal plants are the local heritage with the global importance. World is endowed with a rich wealth of medicinal plants. Medicinal plants also play an important role in the lives of rural people, particularly in remote parts of developing countries with few health facilities. The current report shows that Millingtonia Hortensis Linn is a favourite garden tree commonly known as Cork tree. It Is a perennial herb. The plant has high medicinal values and is used for indigenous treatment of numerous diseases including asthma, rheumatism, tuberculosis, cancer, antipyretic, sinusitis and as an cholagogue and tonic This review find the description of the herb. Phytochemistry, mutagenicity and antimutagenicity. Antimicrobial activities like antibacterial, antifungal, anticonvulsant, and larvicidal activity, different types of pharmacologically actions like antioxidant, induction of apoptosis on RKD colon cancer cell line, antihelminthic, antiproliferative antiasthmatic and hepatoprotective-activity. This review will definitely help for the Researchers as well as practioners, dealing with this plant, to know its proper usage. Therefore, considering its versatile medicinal uses, there is an ample scope for future research on Millingtonia hortensis Linn and hence further pharmacological investigations are warranted.

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