INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Review Paper

Mussaenda Frondosa (Bellothi): A Comprehensive Review of Phytochemistry and Pharmacological Properties

Chaithanya M.*, Dr. Karunakar Hegde

Department of Pharmacology, Srinivas College of Pharmacy, Valachil, Farangipete Post- Mangalore, Karnataka, India. 574143

ARTICLE INFO

Published: 16 Apr. 2025
Keywords:
Mussaenda frondosa, Rubiaceae, flavonoids
DOI:
10.5281/zenodo.15228644

ABSTRACT

Mussaenda frondosa, commonly known as Bellothi, is a medicinal herb of the family Rubiaceae that is found throughout India, Sri Lanka, and other tropical places. This plant has an extensive history of use in traditional medicine for treatment of jaundice, asthma, fever, and skin infection. *Mussaenda frondosa* is rich in bioactive compounds such as flavonoids, alkaloids, tannins and glycosides, which exhibit marked pharmacological activities of antimicrobial, antioxidant, anti- inflammatory, hepatoprotective and healing. Phytochemical studies proved to have found the presence of rutin, quercitin, hyperin and other flavonoids which aid in having medicinal importance. The plants leave, roots, sepals and flowers are used extensively in herbal medicine for treating liver ailments and other respiratory and microbial infections. The various herbal extracts of *Mussaenda frondosa* had been reported to possess hypolipidemic, diuretic and radical scavenging effects which can aid in drug development. This review focuses on the botanical description, traditional uses, pharmacological properties, and phytochemical constituents of *Mussaenda frondosa* with particular attention to ethnomedicine and prospects for further pharmacological research. In ethnomedicine, *M. frondosa* is important due to its diverse therapeutic applications which is why it should be scientifically investigated for further development of herbal medicine.

INTRODUCTION

The herbaceous species, or medicinal plants, have different parts with many pharmacological properties. Historically, these herbs, were used for the remedy of various diseases. Herbs are very much useful and have economic value as well. The active principles of plants are now employed in the prevention and treatment of many disorders. These plants have an array of secondary metabolites that

***Corresponding Author:** Chaithanya M.
Address: *Department of Pharmacology, Srinivas College of Pharmacy, Valachil, Farangipete Post- Mangalore, Karnataka, India. 574143*
Email ✉: chaithanyamanjalady@gmail.com
Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

are biologically active and can help alleviate different types of diseases.1 The genus *Mussaenda L*. is one of the largest genera of the Rubiaceae family comprising about 200 species, which have the main distribution in the forests of the tropics of the old world. *Mussaenda frondosa* are widely distributed plants in India, they are frequently used in folk medicine.[2] This genus spread from West Africa to the Indian subcontinent, Southeast Asia, and South China. The genus *Mussaenda* is a significant source of medicinal natural products, the *Mussaenda frondosa* crude extract contain important bioactive principles phenols and flavonoids, alkaloids and steroids, glycosides, tannins, and especially iridoids, triterpenes and flavonoids.[3] *Mussaenda frondosa* Linn belongs to the family Rubiaceae which comprises 500 genera and about 5300 species of medicinal plants. *Mussaenda* is a genus of flowering plant which is quite popular because of the beauty of its species. *Mussaenda frondosa Linn*. is found in abundance throughout India and has a potential to cure numerous diseases. [4] *Mussaenda frondosa* (MF) is a plant species belonging to the *Mussaenda* genus and is known to be edible. Different parts of the plant are used in medicine. For instance, a weak infusion made from the stems is used to relieve cough in young children while root juice cures tongue blemishes.[3] Green leaves have stomach issues. Sepals are considered diuretic food that improves memory and protects from various liver illness. Fried sepals of this plant are favourite snacks of village people in Sri Lanka. Herbal porridge prepared using green leaves is said to possess great efficacy for the protection of the liver.[5] The herbal remedies of this plant have been used for ages along with traditionally leaves against jaundice, asthma, hyperacidity, fever, diuretic, inflammation, skin ulcers, leprosy, eye infections, skin infections, tuberculosis, and antimicrobial activity.[6]

Species:

The genus *Mussaenda frondosa* includes the following species*: Mussaenda wallichii, Mussaenda. villosa, Mussaenda macrophylla, Mussaenda nicobarica, Mussaenda pubescens, Mussaenda hirsutissima, Mussaenda Arcuata.*[5.3]

Vernacular Names:[8]

Hindi	Bedhina
Sanskrit,	Sriparnah
Tamil	Seema-katharikkai
Kannada	Bellothi
Bengali	Quash
Nepali	Ishkus
Telugu	Nagavalli

Taxonomy:[9]

Kingdom	Plantae
Phylum	Tracheophyta
Class	Magnoliopsida
Order	Gentenianales
Family	Rubiaceae
Genus	*Mussaenda*
Species	*Frondosa*
Botanicalname	*Mussaenda frondosa L*

Different Strains *of Mussaenda* Species:[10] ***Mussaenda Frondosa***

Mussaenda frondosa occurs across Central Nepal, India and Sri Lanka. Its root is used to extract juice that aids in the treatment of tongue blemishes, while its sepals act as diuretics.

Mussaenda Macrophylla

This species is common through Central and Eastern Nepal up to about 1800 m in altitude in moist localities with herbs and other shrubs. It is also known from Northern India, South eastern China and Myanmar.

Mussaenda Raiatensis

Mussaenda raiatensis is Tonga native species that grows in open areas of ridges, coastal to lowland forests and even grown sometimes for its medicinal value. The infusion of the bark is sometimes given to an infant believed to be ill or malnourished.

Mussaenda Pubescens

This liana-type shrub can be found in the shady hillside, valley, and shrub jungle of East, South and Southwest China. It has been reported to be used in traditional Chinese medicine for its diuretic effect and anti-chlorotic and anti-pyretic functions. The whole plant of *Mussaenda pubescens* has been used against laryngopharyngitis, acute gastroenteritis and dysentery and as a contraceptive agent.

Mussaenda roxburghii

This is found in Central and Eastern Nepal between the height range of 200 - 1200 feet in humid, shady areas of Bhutan, Bangladesh, and Myanmar. Its root is used in boiling treatment by applying the paste to the tongue.

***Mussaenda frondosa* (Dhobi tree)**

This is seen in Indo - China and extends to Malaysia. It is a bit bigger and grows in an erect form up to 9 ft tall. The leaves are a pale green color while the terminal flower clusters are orange yellow with tubular corollas. The corolla has single white enlarged calyx lobe. This species is often grown in clumps

Mussaenda incana

This species is found from India all the way to Malaysia. It is smaller as compared to the rest with a maximum height of three ft. The flower clusters (corymbs) have bright yellow corolla and a single calyx lobe which is cream in color. This species in particular is very helpful in massplanting.

Distribution of Plant

Mussaenda frondosa is distylous, meaning it bears long- or short-styled flowers. Drupes can only be set with pollen from the opposite stylar morph, although pollen of both morphs is capable of germination (unpublished data). This plant species is only sparsely distributed along forest edges (e.g. 15 individuals along a linear 2 km edge) and it exhibits small, tightly closed, tubular, vivid orange flowers. A sepal of a flower in a set is usually one that is expanded into a white bract, which is leaf shaped and presented vertically. Bracts remain through the flowering stage while its flowers remain open for just 24 hours.[11] *Mussaenda frondosa* syn *Mussaenda glabrata* is a sprawling shrub of Western ghats, Andamans, Konkan, Malabar and Tirunelvelly hills. Leaves are, in general, rounded elliptic, shortly acuminate and puberulous. Flowers are terminal in open cymes berries 10-13cm, subglobose or obovoid, glabrous. *Mussaenda Frondosa* distributed in Central Nepal, India and Srilanka.[12]

Phytochemical Constituents:[13]

Some preliminary phytochemicals screenings of diferent *Mussaenda frondosa* extracts have shown the presence of flavonoids, saponins, glycosides,

steroids, mucilage, phenolic compounds and even proteins. *Mussaenda frondosa* in addition has been described to exhibit wide spectrum activity against gram positive and gram-negative microbes. In one instance of traditional medicine, the sepals are classified as diuretic while the root juice is reported to be used to cure blemishes of the tongue. Some of the methanolic extracts obtained from *Mussaenda frondosa* sepals contain phytoconstituents such as rutin, quercetin, hyperin, singapic acid, ferulic acid and stigluside.

Botanical Description:[14]

Root:

The *Musseanda frondosa* plant is characterized by a roundish shape with a yellowish white colour, fibrous roots which are hairy and root ends and base that have the same appearance.

Stem:

The *Musseanda frondosa* plant has a short brown stem that is 2-8 metres long with one stem only, round with a diameter of 1-3 cm, and long internodes of 15-25 cm. It is geotropic in growth and has serrated leaf encircling books.

Leaf:

Musseanda frondosa has almost the same parts as Tambora plants but there is a pancreatic part which has a leaf breadth of 43.0 mm, a surface of 95.3 mm in length and are hairy leaves of the simple leaf type.

Flower:

Musseanda frondosa has orange hairy flowers with oval false petals scaled like the leaves, compounded with white petals forming asymetric flowers at the ovary portion tuber and having four lobes at the recrown. It is about 1 – 2 inches with a stalk of about 1 inch. The system is in a panicle shape.

Fruit:

Fruits differ greatly in shape with inclusions of globes, ovoid, ellipsoid, pyriform with whites, yellow and different shades of green in color. Length varies from 1.7 inches to 10. 4 inches while breadth is 1.2 to 7.6 inches in diameter.

Figure 1: *Mussaenda frondosa* plant

Figure 2: Flower of *Mussaenda frondosa*

Figure 3: Root *of Mussaneda frondosa*

Figure 4: Leaves of *Mussaenda frondosa*

Figure 5: Stem of *Mussaenda frondosa*

Therapeutical uses:

Wound healing properties:[3]

Mussaenda frondosa has flavonoids which prevents cells from undergoing lipid peroxidation and is thought to enhance their viability by improving perfusion, preventing damage, stimulating DNA damage, and so on aiding the healing of wounds.

Antibacterial and Antifungal properties:[15]

The methanoli extract *Mussaenda frondosa* extracts displayed important antibacterial and antifungal activities unlike the hexane extract *Mussaenda frondosa* and ethanolic extract of *Mussaenda frondosa*, a phenomenon which may be due to the presence of phenolics, flavonoids and other bioactive compounds discovered via the phytochemical screening.

Hepatoprotive properties:[1]

The *Mussaenda frondosa* contained alcoholic extracts demonstrated remarkable hepatoprotective activity against paracetamol induced hepatic injury. These were due to the presence of flavonoids, proteins and glycosides, whereas, chloroform and ether extract did not contain flavonoids and sterols, and may have only

contained carbohydrates and glycosides, possibly these extracts in providing hepatoprotection.

Anti-inflammatory properties:[16]

The methanol extract of *Mussaenda frondosa* may serve as a potential source for a new lead either as a stronger anti-inflammatory drug or potent analgesic or antipyretic drug in the future. It is supported by the presence of flavonoids and triterpenes, alkaloids and glycosides. Flavonoids and triterpenes have been shown to aid in inflammation. The majority of the compounds containing anti-inflammatory actions have been found to contain analgesic actions as well.

Diuretic activity:[17]

The phytohmial investigation conducted on the ethanolic extract of the *Mussaenda frondosa* showed the presence of are alkaloids, tannins, phenolic compounds, carbohydrates, strois and flavonoids, which indicates its diuretic activity. Pará da Silva et al. noticed these signs together with other signs of diuresis while using the known drug Tamsulosin as well as using the extract.

Hypolipidemic properties:[18]

The hypolipidemic effect of *Mussaenda frondosa* was noticed probably due to blockade of hepatic cholesterogenesis and possibly having weak antioxidant properties. It may be concluded that the methanolic extract of *Mussaenda. frondosa* has hypolipidemic activity in those rats that were fed with high fat diet.

Medicinal benefits:

The use of natural compounds in traditional medicine was described practically everywhere in the world. It is claimed that the plant of *Mussaenda frondosa* possesses a number of therapeutic properties against jaundice, asthma, hyperacidity, fever, ulcer, leprosy and diuretic. Antimicrobial, diuretic, hepatoprotective, antipyretic, asthma and cough activity were exhibited by the leaf extract. The leaves of *Mussaenda frondosa* Linn. contain mucilage, steroids, glycosides, saponins, resin and flavonoids.[19]

CONCLUSION:

Mussaenda frondosa is a promising medicinal plant with significant potential in modern pharmacology. Its widespread use in traditional systems highlights its therapeutic value, particularly in treating conditions such as jaundice, asthma, fever, liver ailments, and various infections. Rich in phytoconstituents like flavonoids, alkaloids, glycosides, and phenolic compounds, the plant exhibits diverse pharmacological activities including antimicrobial, antioxidant, hepatoprotective, anti-inflammatory, diuretic and hypolipidemic properties. This comprehensive review need for further scientific validation and pharmacological studies to isolate, characterize, and understand the mechanisms of its bioactive compounds. With continued research, *Mussaenda frondosa* could serve as a valuable source for the development of novel herbal formulations and therapeutic agents.

REFERENCES

1. SN S, Patil PA, Kangralkar VA. Protective activity of Mussaenda frondosa leaf extracts against paracetamol induced he-patic damage in wistar rats. Journal of Pharmacy Research. 2010;(4):711-3.
2. Shimpale VB, Yadav SR, Babu CR. A review of the Genus Mussaenda (Rubiaceae) from Great Nicobar Island, India, including a new species. Rheedea. 2009;19(1):53-7.
3. Faleel N, Kananke T, Perera N. Development of Mussaenda frondosa sepal infused functional tea with enhanced antioxidant and

alpha-amylase inhibitory activities. Discover Food. 2024 ;4(1):138.
4. Setia A, Nagdev S, Sharma M, Alok S, Tiwari S, Verma M, et al. Nanotherapeutic approaches, phytochemistry and pharmacological prospects of plant Mussaenda frondosaLinn. a holistic investigation. Int J Pharm Sci Res.2022;13(7):1000-13.
5. Kesari A, Maiti BC. Anthelmintic activity of the leaves of Murraya koenigii Linn and Mussaenda frondosa Linn. World J Pharm Res. 2015;4(2):1246-1251.
6. Vadivel E, Gopalakrishnan S. GC-MS analysis of some bioactive constituents of Mussaenda frondosa Linn. Int J of Pharma and Bio Sci.
7. Shanthi S, Radha R. Anti-microbial and phytochemical studies of Mussaenda frondosa Linn. Leaves. Pharma J. 2020;12(3).
8. Pappachen LK, Sreelakshmi KS. Phytochemical screening and in vitro cytotoxicity studies of Mussaenda frondosa Linn leaves. Res J of Pharm and Tech. 2017;10(12):4227-30.
9. Phan MN, Nguyen PT, Tran KH, Bui DT, Van Tan H, Van Dang S, Mai TD. Chemical constituents from aerial parts of Mussaenda saigonensis. Science & Technology Development J Nat Sci. 2023;7(4):2770-5.
10. Doe J. Phytochemical evaluation and green synthesis of silver nanopaticles from morinda citrifolia l. And Mussaenda frondosa [Doctoral dissertation], St. Teresa's college (Autonomous).2024.
11. Siju EN, Rajalakshmi GR, Kavitha VP, Anju J. In vitro antioxidant activity of Mussaenda frondosa. Int J Pharm Tech Res. 2010;2(2):1236-40
12. Vidyalakshmi KS, Vasanthi HR, Rajamanickam GV. Ethnobotany, phytochemistry and pharmacology of Mussaenda species (Rubiaceae). Ethno Lea. 2008;(1):57.
13. Borges RM, Gowda V, Zacharias M. Butterfly pollination and high-contrast visual signals in a low-density distylous plant. Oecologia. 2003;1(36):571-3.
14. Ramakrishnan S, Mohammed S, Harindran JP. Evaluation of diuretic activity of Mussaenda frondosa. Asian. J. Pharm. Clin. Res. 2015;(8):117-8.
15. Hujjatusnaini N, Iswahyudi I, Nur-Indahsari LI. Morphological characteristics and content of secondary metabolite compounds of medicinal plants for postpartum infection therapy. J Agro Tan Tro (Juatika). 2024;6(1):80-92.
16. Bose S, Mandal SK, Das P, Nandy S, Das A, Dutta D, Chakraborti CK and Sarkar D, Dey S: Comparative Evaluation of Anti-inflammatory, Antipyretic and Analgesic Properties of Ixora coccinea and Mussaenda frondosa (Rubiaceae) Leaves. Jor J of Pharm Sci 2020; 13(3).
17. Ramakrishnan S, Mohammed S, Harindran JP. Evaluation of diuretic activity of Mussaenda frondosa. Asian. J. Pharm. Clin. Res. 2015; 8:117-8.
18. Wesley JJ, Jeyaananathi J, Ansar AM, Ravikumar K. Hypolipidemic effect of methanolic extract of Mussaenda frondosa Linn. leaves in high fat diet fed rats. J Pharm Res. 2009;2(4):579-81
19. Hujjatusnaini N, Iswahyudi I, Nur-Indahsari LI. Morphological characteristics and content of secondary metabolite compounds of medicinal plants for postpartum infection therapy. J Agron Tanam Trop. 2024;6(1):80–92.

HOW TO CITE: Chaithanya M.*, Dr. Karunakar Hegde, Mussaenda Frondosa (Bellothi): A Comprehensive Review of Phytochemistry and Pharmacological Properties, Int. J. of Pharm. Sci., 2025, Vol 3, Issue 4, 1972-1978. https://doi.org/10.5281/zenodo.15228644