



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



Review Article

Exploring the Medicinal Benefits and Phytochemical Properties of Curry Leaves (*Murraya Koenigii*): A Comprehensive Review

Aman Altaf Padarshi*, Het Bhandari, Rutuja Sunil Nikam

KCT's R.G. Sapkal College of Pharmacy, Nashik, INDIA.

ARTICLE INFO

Published: 16 Aug. 2025

Keywords:

Murraya koenigii, curry leaves, medicinal plant, phytochemistry, pharmacology, Rutaceae

DOI:

10.5281/zenodo.16886263

ABSTRACT

Background: Medicinal plants are a crucial component in traditional and modern healthcare. Curry leaves (*Murraya koenigii*) are prized in Asian cuisine and recognized for their array of bioactive compounds and pharmacological significance. Objective: To systematically review and synthesize the medicinal benefits, phytochemical constituents, and therapeutic applications of *Murraya koenigii*. Methods: A comprehensive literature search was conducted using PubMed, Scopus, and Google Scholar from 2010 to 2024, with keywords “*Murraya koenigii*,” “curry leaves,” “medicinal benefits,” and “phytochemistry.” Peer-reviewed studies in English focusing on pharmacological activities, traditional uses, and phytochemical analysis were included. Results: *Murraya koenigii* contains numerous compounds, such as alkaloids, flavonoids, and essential oils, which confer significant antioxidant, antidiabetic, antimicrobial, anti-inflammatory, and hepatoprotective activities. Both preclinical and clinical studies validate its traditional uses. Conclusion: The accumulated scientific evidence strongly supports the therapeutic potential of *Murraya koenigii*. Further research and clinical trials are warranted to foster novel applications and product development.

INTRODUCTION

Murraya koenigii (curry leaf, kari patta) is a member of the Rutaceae family. Traditionally, it is utilized as an antiemetic, antidiarrheal, febrifuge, blood purifier, tonic, and flavoring agent in curries and chutneys. Its essential oil is applied externally for bruises and eruptions and finds uses in the cosmetic and perfume industries. The plant,

typically a small shrub up to 6m, emits a pleasant aroma and contains a variety of chemical compounds that provide biological and pharmacological benefits. Key phytochemicals—including α -caryophyllene, δ -elemene, β -elemene, and α/β -phellandrene—act to inhibit food spoilage. Curry leaves are also a rich source of carbohydrates, calcium, phosphorus, iron, and vitamins C, A, B, and E, supporting heart health,

*Corresponding Author: Aman Altaf Padarshi

Address: KCT's R.G. Sapkal College of Pharmacy, Nashik, INDIA.

Email : amanpadarshi7890@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.



immunity, and good skin and hair. Carbazole alkaloids in the leaves are linked to numerous health benefits. Essential oil derived from *Murraya koenigii* is commonly used in cosmetics for sun protection and reducing skin redness, and is beneficial for a variety of skin conditions such as acne, athlete's foot, and minor burns. The therapeutic value of curry leaves is attributed to a rich suite of bioactive compounds—alkaloids, flavonoids, and essential oils—which account for its antioxidant, antimicrobial, anti-inflammatory, and hepatoprotective effects. These phytochemicals also underlie its traditional use for treating an array of health issues, from digestive and metabolic disorders to skin problems.

Botanical Description, Taxonomy, and Vernacular Names: ^[11-12]

Botanical Description: ^[11]

Murraya koenigii is indigenous to India, Sri Lanka, and several other South Asian countries. The plant thrives particularly well across India—from Sikkim to Garhwal, in Bengal, Assam, the Western Ghats, and Kerala—and is now cultivated in Malaysia, South Africa, and Reunion Island, largely because of South Indian migration. Of the 14 known species in the genus *Murraya*, only *Murraya koenigii* (L.) Spreng. and *Murraya paniculata* (L.) Jack occur in India. *Murraya koenigii* is well-known for its medicinal benefits and culinary importance as a natural flavoring in curries.

• **Taxonomy:** ^[12]

Kingdom: Plantae

Subkingdom: Tracheobionta

Super Division: Spermatophyta

Division: Magnoliophyta

Class: Magnoliopsida

Subclass: Rosidae

Order: Sapindales

Family: Rutaceae

Genus: *Murraya* J. Koenig

Species: *Murraya koenigii* (L.) Spreng

• **Vernacular Names:**

English: Curry Leaves

Hindi: Karipatta, Mitha neem

Kannada: Karibevu

Tamil: Kariveppilai

Malayalam: Kariveppu

Marathi: Kadhilimb

Sanskrit: Girinimba

Telugu: Karepeku

Tulu: Bevusoppu

German: Curryblätter

Drug Profile: ^[13-18]

Biological Source: ^[13]

The species name honors the botanist Johann Koenig, while the genus, *Murraya*, pays tribute to the Swedish physician and botanist Johann Andreas Murray. Therefore, the correct botanical name is *Murraya koenigii*.

Family: Rutaceae



Fig 1: Murraya Koenigii



Chemical Constituents: ^[14-18]

Murraya koenigii is abundant in various organic compounds with diverse chemical compositions, including alkaloids, flavonoids, carbohydrates, and sterols. These compounds can be extracted using solvents such as petroleum ether, ethyl acetate, chloroform, ethanol, and water

- **Alkaloids:** Notable examples include girinimbine, koenine, koenigine, and koenidine.
- **Terpenes:** This category encompasses compounds like α and β -caryophyllene, δ -elemene, β -elemene, α and β -phellandrene, cis- β -ocimene, γ -terpinene, m-cymene, α -terpinene, β -myrcene, camphene, α -thujene, eucalyptol, caryophyllene oxide, and phytol.
- **Carbazole Alkaloids:** An example of this group is girinimbine.
- **Minerals:** Includes essential elements like calcium, phosphorus, and iron.
- **Vitamins:** Contains important vitamins such as thiamine (vitamin B1), riboflavin (vitamin B2), and niacin (nicotinic acid).
- **Sterols:** Features compounds like sitosterol.
- **Carotenoids:** Provides carotene.
- **Phenolic Compounds:** Various phenolic compounds are also present.
- **Others:** Includes 1,4-methanoazulen-9-ol.

4. Traditional Uses: ^[19,20]

Traditionally, various forms—including fresh leaves, dried powder, and essential oil—are used to enhance the flavor of soups, curries, meat, and egg-based recipes. The essential oil is an ingredient in aromatherapy, soaps, and cosmetics. Curry leaf-infused coconut oil is a common traditional hair tonic, promoting pigmentation and hair growth. Medicinal uses include antiemetic,

antidiarrheal, febrifuge, blood purifier, antifungal, anti-inflammatory and analgesic properties, and treatment for nausea, vomiting, bruises, and kidney discomfort.

5. Therapeutic Benefits: ^[21]

- **Diabetes Management:** Hypoglycemic effects attributed to bioactive alkaloids and phenolics

- **Anemia Prevention:** High iron content increases hemoglobin and RBC count

- **Vision:** Vitamin A and β -carotene improve eyesight

- **Antimicrobial & Immune Support:** Potent antibacterial, antifungal, anti-inflammatory, and antioxidant properties support immunological health

- **Weight Management:** Carbazole alkaloids prevent weight gain, reduce LDL, detoxify, and promote fat breakdown

- **Digestive Health:** High fiber content aids gastrointestinal function

- **Cancer Prevention:** Phenols and carbazole alkaloids are active against prostate and colorectal cancers

6. Phytochemistry: ^[22-23]

Mature curry leaves contain approximately 63.2% moisture, 1.15% nitrogen (as protein), 14.6% carbohydrates (primarily total sugars), and 13.06% total ash. Key bioactive compounds include oxalic acid, resins, and an array of carbazole alkaloids with significant pharmacological relevance.

Roots:

Roots contain compounds such as murrayanol, murrayagetin, and marmesin-1''-O-rutinoside. Several alkaloids—including mukoenine A-C, murrastifoline F, bis-2-hydroxy-3-methylcarbazole, bis-mahanine, bikoquinone A, and bismurrayquinone A—have been isolated from root bark. Benzene



extracts yield mukoline and mukolidine, while koenoline (1-methoxy-3-hydroxymethylcarbazole) is another characteristic root-bark component.

Fruits:

Petroleum ether extracts yield mahanimbine and koenimbine, along with isomahanine, murrayanol, murrayazolidine, girinimbine, and mahanine.

Seeds:

Seeds contain carbazole alkaloids including kurryam, koenimbine, and koenine, alongside indicolactone, anisoalctone, and 2',3'-epoxyindicolactone—the first recorded furocoumarin with a monoterpenoid lactone chain in *Murraya* spp.

Leaves:

Leaves contain koenimbine, O-methyl murrayamine, O-methyl mahanine, isomahanine, bis-mahanine, bispyrayafofine, koenidine, murrayacine, Euchrestine B, and bicyclomahanimbicine, along with vitamins, carotenoids, and minerals. Dried leaves also yield glycozoline, 1-formyl-3-methoxy-6-methylcarbazole, and 6,7-dimethoxy-1-hydroxy-3-methylcarbazole.

7. Pharmacological activities: ^[24-34]

Antidiabetic Activity:

Mahanimbine isolated from petroleum ether extract exhibited dose-dependent hypoglycemic effects in streptozotocin-induced diabetic rats at 50–100 mg/kg. The mechanism may involve enhancing pancreatic insulin secretion or stimulating peripheral glucose uptake. It also significantly inhibited α -amylase activity compared with acarbose.

Hypocholesterolemic Activity:

Ethanol leaf extract reduced serum cholesterol in aged mice in a **dose-dependent manner**. At 500 mg/kg, lipid-lowering effects were

comparable to **Simvastatin**.

Antibacterial Activity:

Essential oil inhibited *Bacillus subtilis*, *Staphylococcus aureus*, and *Corynebacterium pyogenes* effectively even at 1:500 dilution. Acetone leaf extract yielded bioactive carbazole alkaloids with mosquitocidal and topoisomerase inhibitory activities.

Antifungal Activity:

Essential oil showed strong inhibition of *Candida albicans* and *Aspergillus niger*; ethanolic leaf extracts were effective against *Colletotrichum falcatum*.

Anti-inflammatory Activity:

Ethanolic and methanolic extracts significantly reduced carrageenan-induced paw edema in rats, with methanol extract showing the strongest effect.

Hepatoprotective Activity:

Methanolic and aqueous extracts protected against CCl_4 and ethanol-induced hepatic damage in rats, reducing serum ALT, AST, and ALP levels, comparable to Silymarin.

Antipyretic Activity:

Ethanol extracts reduced yeast-induced fever in rats more effectively than petroleum ether or chloroform extracts, with results comparable to paracetamol.

8. Rationale Work:

Traditional uses and modern pharmacological findings highlight the importance of **Murraya koenigii** as a versatile medicinal plant. Despite widespread culinary and folk medicinal use, systematic reviews that correlate its rich phytochemical profile with specific therapeutic effects are relatively limited. This review aims to fill this gap and serve as a bridge between



ethnobotany and evidence-based medicine. of various parts of the plant .

9. Aim And Objective: -

Aim: -

Exploring the Medicinal Benefits and Phytochemical Properties of Curry Leaves (*Murraya koenigii*): A Comprehensive Review

Objective:-

- To systematically review and analyze the health benefits of *Murraya koenigii*, emphasizing both traditional knowledge and experimental/clinical evidence.
- To compile and interpret the phytochemical profile and bioactive constituents of curry leaves.
- To discuss specific therapeutic areas such as antidiabetic, anti-inflammatory, antimicrobial, hepatoprotective, and antipyretic effects.
- To summarize mechanisms of action associated with key compounds.
- To highlight current gaps and propose directions for further research and application.

10. Literature Review:

Several studies by Indian and international researchers emphasize the therapeutic value of *Murraya koenigii*:

- **Maheswari Reddy et al (2018):** Documented the wide usage of *M. koenigii* for its antioxidant, antidiabetic, antibacterial, and antihypertensive activities, and its role as a traditional remedy for common ailments.
- **Mamta Parnami et al (2018):** Highlighted its value as a hypocholesterolemic agent, supporting the role of crude extracts in health and nutrition.
- **Satish Chand Saini et al (2015):** Reviewed the antibacterial, antifungal, and antiprotozoal activities, focusing on the pharmacological value

- **Dheeraj K. Gahlawat et al (2014):** Described its potential in treating digestive, metabolic, and skin conditions, with emphasis on the isolation of active carbazole alkaloids.

- **Muthulinggam Nishan et al (2014):** Provided ethnobotanical perspective on its use in treating dysentery, renal pain, stomach upsets, and showcased the medicinal potential of carbazolealkaloids.

- **Ajay S. et al (2011):** Offered a comprehensive review of phytochemical and pharmacological studies, reinforcing its position as a widely used herbal remedy.

Summary:

Curry leaves (*Murraya koenigii*) are a rich source of diverse phytochemicals—especially carbazole alkaloids, terpenes, flavonoids, and essential oils—with broad medicinal benefits shown in both traditional and contemporary studies. Research supports their use in treating diabetes, infections, inflammation, liver disorders, and hyperlipidemia. Bioactive compounds contribute antioxidant, antimicrobial, and hepatoprotective effects, validating traditional uses in Indian medicine. Regular dietary inclusion may help in preventive health and as an adjunct in various therapies.

CONCLUSION:

Murraya koenigii is an important medicinal and nutritional plant with a long history in folk medicine and a growing body of pharmacological evidence. Its unique phytochemical composition translates into significant antidiabetic, hepatoprotective, anti-inflammatory, antimicrobial, and lipid-lowering activities. Further phytochemical, pharmacological, and especially large-scale clinical research are recommended to unlock its full potential as a natural health product and functional food



component.



Future Scope:

- **Expanded Clinical Trials:** Needed for robust evidence in metabolic and digestive health.
- **Advanced Phytochemical Analysis:** Detailed investigation into individual bioactive compounds and their mechanisms.
- **Product Development:** Potential for dietary supplements, functional foods, and novel drug formulations based on standardized curry leaf extracts.
- **Integrated Medicine:** Use in combination with standard therapies for enhanced outcomes.
- **Public Education:** Promoting dietary inclusion and awareness of medicinal benefits.
- **Sustainable Cultivation:** Research into agronomic practices for quality control and supply.
- **Market Expansion:** Exploration of international opportunities in the natural products sector.

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HOW TO CITE: Aman Altaf Padarshi*, Het Bhandari, Rutuja Sunil Nikam, Exploring the Medicinal Benefits and Phytochemical Properties of Curry Leaves (*Murraya Koenigii*): A Comprehensive Review, *Int. J. of Pharm. Sci.*, 2025, Vol 3, Issue 8, 1797-1805. <https://doi.org/10.5281/zenodo.16886263>

