

A Review on *Murraya koenigii* (Curry Leaves): A Versatile Multi-Potential Medicinal Plant

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ABSTRACT

Murraya koenigii is a multipurpose plant, the plant is a native of India. Curry trees, or *M. koenigii*, are popular culinary plants whose leaves have been used for centuries as a spice, garnish, or flavouring. They add taste and nutrients to cuisine. *M. koenigii* has a wide range of medicinal uses in numerous traditional medical systems, such as Ayurveda, Siddha, and Unani. These include treating bronchial illnesses, piles, vomiting, skin ailments, and more. Different tribal communities make extensive use of the plant's varied parts. Pharmacological studies evidenced its potential antioxidant, anti-inflammatory, anticancer, hepatoprotective, immunomodulatory, antimicrobial, and neuroprotective activities, among others. Curry leaves are applied topically to treat skin eruptions, burns, and bruises. It can be applied to stop hair from greying too soon. The soap business uses the plant's oil, known as curry leaf. It is necessary to gather the thoroughly researched pharmacology, phytochemistry, and therapeutic potential of this plant in order to evaluate its potential as a useful therapeutic agent for the management and treatment of a range of human conditions. This study reviewed the pharmacognostic, phytochemical, pharmacological, and ethanobotanical characteristics of the *M. koenigii* plant.

Keywords: Curry leaves, Traditional medicine, Anti-inflammatory, Analgesic, Pharmacology, Phytochemistry.

INTRODUCTION

Among fourteen global species belongs to the genus of *Murraya*, only *Murraya koenigii* Spreng and *Murraya paniculata* (Linn) is available in India.¹ As Meethi neem, *Murraya Koenigii* Linn (Rutaceae) is a fragrant, tiny tree or shrub that is primarily deciduous and grows up to 6 meters in height. It is planted up to 1500 meters above sea level for its fragrant leaves and is found all over India. In traditional medicine, it is utilized as a blood thinner, febrifuge, antiemetic, antidiarrheal, and dysentery treatment. chutneys and curries can benefit from the stomachic, tonic, purifying, and Savory ingredient. external application of the oil on bruising eruption in the soap and scent sectors.²

The plants thrive in sunny to semi-shaded spots in tropical and subtropical climates, but they may also be maintained in other climates by relocating pots to warm, protected areas in the winter and keeping humidity levels high in regions with hot, dry summers. They are quite susceptible to frost. The soil must have good drainage and be fortified with a lot of organic matter. In dry conditions, water well but not excessively. Fertilizer is not really needed by the plants. Seeds sprout really quickly.³ The plant is highly valued for its leaves, which are an essential ingredient in Indian cuisine that enhance flavour and texture. For stomach ache, the leaves, root, and bark are tonic. Leaves are used internally in human medications, such as loose bowels. Phytochemicals are also considered secondary, similar to checking and repeating.⁴

Because they contain volatile oil and have a distinct aroma, curry leaves (*Murraya koenigii*) are a popular leaf spice that is used in very small amounts to aid in digestion. Asian culinary traditions frequently employ these leaves to add flavour to dishes. The flavour

and other characteristics of the leaves remain after drying, with a somewhat bitter, faintly acidic, and pungent taste. Indian, Ayurvedic and Unani treatments, among other traditional civilizations, also employ curry leaf. This study aims at to discover pharmacognostic, phytochemical, and pharmacological characteristics of the *M. koenigii* plant and its numerous benefits to human beings.⁵

Taxonomical Classification of *M. koenigii* (Curry leaves) ⁶⁻⁹

Table no. 1 describes taxonomical classification of *M. koenigii* plant, which includes its Kingdom, Subkingdom, Class, Family, Genus, Species and all other information.

Table 1 Taxonomical Classification of *M. koenigii*

Kingdom	Plantae
Subkingdom	Tracheobionta
Super division	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Rosidae
Family	Rutaceae
Genus	<i>Murraya J. Koenig</i>
Species	<i>Murraya koenigii</i>

Distribution of *M. koenigii* plant all over India

Native to South Asia, curry plants can be found in many of these countries such as India, Sri Lanka, Myanmar, Indonesia, Hainan, and certain wet forests in China, Vietnam, Nepal, Laos, Bhutan, Pakistan, and Thailand. Although it is found all over India, it is particularly easy to find in the Andaman Islands, Sikkim, Bengal, Assam, Western Ghats, and Garhwal.¹⁰

It propagates via seeds that spontaneously sprout in partially shaded environments. It is also found in various Asian regions, such as the humid forests of Guangdong, South Hainan, South Yunnan (Xishuangbanna), Bhutan, Laos, Nepal, Pakistan, Sri Lanka, Thailand, and Vietnam, which range in elevation from 500 to 1600 meters. Curry leaves travelled to Malaysia, South Africa, and the island of Réunion with immigrants from South India. Seldom do they exist outside of India's area of influence.¹¹

Various Names of *M. koenigii*¹²

Table 2 Names of *M. koenigii* in various languages

English	Curry leaves
Kannada	Karibevu Karipatta
Hindi	Mithanim
Tamil	Kariveppilai
Malayalam	Kariveppu
Marathi	Kadhilimb

Table 2 shows variety of synonyms or names that are available for *M. koenigii* plant, means curry plant has number of names in various languages.

Phytochemical Constituents of *M. koenigii*¹²

The constituents that have sparked the greatest attention are carotenoids, essential oils, and a variety of carbazole alkaloids. The components of *Murraya* are summed up in the following major group of bioactive compounds. This article provides a better understanding of curry leaf's therapeutic and non-therapeutic characteristics by compiling a variety of ideas from the many studies that have been conducted on the subject.

Growing season of *M. koenigii*¹³

Curry leaf plants produce bright green leaves and blossoms throughout the spring, summer, and fall. During the winter, when it is resting, the leaves fall. They require fertilizer in the summer months and prefer full light and well-drained soil that is on the dry

side. It was noted that the fruiting season lasted from the end of June to the end of August, with July being the peak fruiting season. In India, leaf harvesting began fifteen months after the plants were planted, and leaf gathering was repeated every two to three months.

Traditional uses of *M. koenigi*

- To flavour soups, curries, and other food preparations, fresh leaves, dried leaf powder, and essential oils are frequently utilized. Additionally, the aromatherapy and soap industries use essential oils.¹⁴
- To make a fantastic hair tonic that preserves natural hair tone and promotes hair development, curry leaves are cooked with coconut oil until they are reduced to blank residue. It has been used traditionally as a whole or in portions for bodily aches, kidney pain, vomiting, antiemetics, antidiarrheal, febrifuge, blood purifier, and antifungal.¹⁵
- It contains large amounts of calcium, iron, and vitamins A, B, C, and B2. Both young and old benefit from its nutritional value. Curry leaves are a perfect natural calcium supplement for women who suffer from osteoporosis, calcium shortage, and other related conditions.¹⁶
- When combined with sugar and lime juice, fresh curry leaf juice works well as a medication for treating morning sickness, nausea, and vomiting brought on by indigestion and overindulgence in lipids. In these circumstances, one or two tablespoons of the leaf juice combined with a teaspoon of lime juice may be consumed.¹⁶

Morphological Characteristics of *M. koenigi* L.¹⁷⁻¹⁸

M. koenigi L. is a deciduous shrub with a maximum height of 6 meters. Its bark peels off lengthwise, exposing white wood beneath the bark up to 16 centimetres in height.

a. Leaves

The flavour and smell of leaves are distinctive, and they are green in colour. With 24 lanceolate, 1.9 cm long, 1.8 cm broad, and 0.5 cm long petioles, each exstipulate, bipinnately compound, 30 cm long leaflet has reticulate venation.

b. Stem

The main stem has many spots on it and is dark green to brownish in colour. Its white wood beneath can be seen by peeling off the bark longitudinally.

c. Flowers

Spherical to oval, 1.4–1.6 cm length, 1–1.2 cm in diameter; 880 mg in weight, 895µL in volume.

d. Fruits

Fruits are fully ripe, black, and have a glossy appearance. The pulp is wistaria blue, and there are anywhere from 32 to 80 fruits in each cluster.

e. Seeds

One spinach-green fruit, measuring 11 mm in length and 8 mm in diameter.

Benefits of *M. koenigi*¹⁹

Curry leaves are a veritable rainbow of health benefits, full of minerals including carbs, fibre, calcium, phosphorus, iron, magnesium, zinc, several vitamins, and flavonoids. It is widely used to treat a variety of conditions, including skin, hair, and renal issues, diabetes, obesity, dyspepsia, and anaemia.

1. High on Fiber: Curry leaves are a great way to get fibre. It improves the regularity of our bowel movements and digestive wellness. Not only does it help with nausea and diarrhoea, but it also regulates the body's blood sugar.

2. Loaded with Proteins: Curry leaves contain a lot of proteins, which are thought to be the building blocks of life. It boosts our immune system and is necessary for the body's healthy growth and development.

3. Powerhouse of Calcium: It is well recognized that calcium helps to maintain healthy bones. Curry leaves are a great source of calcium, which helps to strengthen bones and teeth and prevent conditions like osteoporosis and osteomalacia.

4. Rich in Phosphorus: Phosphorus, one of the most vital elements in curry leaves, aids with kidney purification. It helps to maintain a regular heartbeat, reduce excruciating post-exercise muscular spasms, and fortify bones and teeth. Phosphorus is required for the biological growth and repair of tissues and cells.

5. Abundance of Essential Oils: Curry leaves supply a range of volatile essential oils, such as α -pinene, sabinene, β -pinene, and α -terpinene, in addition to minerals and vitamins. Especially advantageous for the skin, hair, and dental health are these essential oils' anti-inflammatory in nature, antibacterial, anti-diabetic, anti-dysenteric, carminative, and digestive qualities. Along with helping with digestion, it also works well against hyperglycaemia and elevated cholesterol.

Nutrients Values of *M. koenigii*²⁰⁻²¹

Table 3 Nutrients Values of *M. koenigii*

Sr.No.	Nutrients value as per 100gram	Fresh curry leaf	Dry curry leaf
1	Protein	6g	12g
2	Fat	1g	5.4g
3	Carbohydrate	18.7g	64.31g
4	Calcium	830mg	2040mg
5	Iron	0.93mg	12mg
6	B-carotene	0.0031mg	0.0059mg

Table 3 describes nutrient essentials of *M. koenigii* plant, as curry leaves are rich source of proteins, fats, carbohydrates, calcium, iron and B- carotene.

Pharmacognosy *M. Koenigii*²²

Major phytochemicals found in the plant give it therapeutic value for a variety of ailments and enable the production of valuable human medications. Pharmacognostic factors can be quantitatively determined to assist create standards for crude medications. The overall amount of ash is a crucial factor to consider when assessing the purity of medications. The plant's pharmacognostic invariants, diagnostic microscopic traits, and numerical standards are described; these are especially helpful in creating an appropriate monograph for the plant's appropriate identification. In addition to determining the amount of nutrients and leaf content, pharmacognostic assessment, microscopic, and morphological characteristics were examined. Additionally, qualitative chemical analyses were conducted as part of the phytochemical screening process. The leaf featured asymmetrical base venation with a dentate border. On both sides, the stomata were dispersed. There are several phytochemicals such as volatile oils, flavonoids, alkaloids, sterols, carbs, tannins, and anthraquinone glycosides. The colour, flavour, smell, and exterior features of *M. koenigii*'s bark were all noted as organoleptic qualities.

Phytochemistry *M. Koenigii*²²

The nutritional value of the matured curry leaves is 13.06% total ash, 1.15% nitrogen, 14.6% carbohydrates, and 63.2% moisture. Curry leaves contain oxalic acid, resin, and carbazole alkaloids as well as major bioactive substances like koenigine, cyclomahanimbine, murrayastine, coumarin, bicyclomahanimbicine, koenidine, and pypaya foline-carbazole. These bioactive compounds have been shown to have significant pharmacological activities, and the majority of the volatile oil is made up of bicycle-mahanimbicine and mahanimbicine.

***Murraya koenigii* plant used in various purpose by tribal community of Jhunjhunu District, Rajasthan.²³**

Table 4 concludes various purposes of curry leaves by tribal community of Jhunjhunu District, Rajasthan. Different parts of the plant exhibits variety of benefits such as it is used in flavouring soups, curries dish for flavouring, datun for clean teeth, dysentery, vomiting, snake bite and so on.

Table 4 Various Purposes of Curry leaves

Sr. No.	Plant part	Uses
1.	Leaves, root, bark, and fruits	Used for flavoring soups
2.	Fresh leaves	Used in curries dish for flavoring
3.	Branches	Used as datun for clean teeth
4.	Powdered of dry leaf	Used as antiperiodic
5.	Roots	Used as stimulant
6.	Bark	Used in snake bite
7.	Leaves	Used in dysentery, vomiting

Pharmacological Activity of *Murraya Koenigii*

➤ Effect on Heart

On an isolated frog heart, an ethanolic extract of fresh *Murraya koenigii* leaves exhibits a dose-dependent positive inotropic effect. The reaction to *Murraya koenigii* 62.5 - 1000 microgram was not impacted by the use of sildenafil, propranolol, imidazole, or theophylline. The variations in sodium and potassium concentrations remained constant. *Murraya* According to the results, *koenigii* may have produced a favourable inotropic impact by making more calcium available from extracellular locations.²⁴

➤ Antimicrobial Activity

Antioxidant Characteristics The stem bark of *Murraya koenigii* yielded benzoisofuranone compounds, three recognized steroids, and six known carbazole alkaloids. The effectiveness of these compounds has been seen in the concentration range of 3.13 - 100 µg/ml (23, 24). Three carbazole alkaloids like mahanine, murrayanol, and maanimbine were identified from the *Murraya koenigii* fresh leaf acetone extract. Mahanimbine shown antioxidant activity at 33.1 µg/ml, whereas murrayanol showed an IC50 of 109 µg/mL against hPGHS-1 and an IC50 of 218 µg/mL against hPGHS-2 in anti-inflammatory experiments. These three carbazole alkaloids showed inhibitory effects on topoisomerase I and II, as well as antibacterial and mosquitocidal properties.²⁴

➤ Antiulcer Activity

The antiulcer properties of *Murraya koenigii* aqueous and solvent ether extracts were investigated in an albino rat stomach ulcer model caused by reserpine. *Murraya koenigii* extracts in aqueous and solvent ether form are useful in treating stomach ulcers and may be just as protective as ranitidine. Gastric secretion was significantly inhibited by the *Murraya koenigii* 200-400 mg/kg extract dosage.²⁴

➤ Alzheimer disease therapy

Memory significantly improves in a dose-dependent manner after receiving an ethanolic extract of *M. Koenigii* leaves for a duration of 15 days. A diet high in *M. koenigii* leaves significantly improved the memory scores of both young and old mice in a dose-dependent manner. It also significantly lessened the amnesia caused by scopolamine (0.4 mg/kg, intraperitoneally) and diazepam (1 mg/kg, intraperitoneally), according to the results, which also showed a reduction in brain cholinesterase activity and total cholesterol levels.²⁴

➤ Anti-diarrhoeal property

Numerous important bioactive substances, including kurryam, koenimbine, koenine, and carbazole alkaloids, are present in the n-hexane extract of the seeds of the *Murraya koenigii* plant. These substances have an inhibitory impact or activity against castor oil- and PGE2/prostaglandin-2-induced diarrhoea in rats. According to the charcoal meal test, the chemical is also helpful in reducing the motility of the gastrointestinal tract in Wister rats.²⁵

➤ Antipyretic activity

Additionally, *murraya koenigii*'s ethanolic leaf extract has antipyretic properties. According to the study, leaf extracts extracted using ethanol are more advantageous than those extracted using petroleum ether or chloroform.²⁵

➤ **Antidiabetic Agent**

The molecular component mahanimbine is present in the *Murraya Koenigii* petroleum ether extract. According to research, mahanimbine works by enhancing the pancreatic release of insulin from β -cells, which lowers blood sugar levels and increases insulin levels. An additional investigation revealed that, when compared to the anti-diabetic medication acarbose, the chemical compound mahanimbine likewise had an inhibitory action against α -amylase.²⁵

➤ **Chemoprotective activity**

When injected intraperitoneally with 50 mg/kg of cyclophosphamide prior to an albino rat injection, the methanol extract of *M. koenigii* leaf, given as a single dose, reduced chromosomal damage caused by the drug and improved bone protection.²⁶

➤ **Wound healing effect**

By inhibiting epithelialization and promoting collagen synthesis, *Murraya koenigii* leaf has been shown to have wound-healing properties. Furthermore, in both excision and incision wound models in male rats, the ethanol extract of its leaves demonstrated wound-healing activity.²⁶

➤ **Anti-inflammatory and analgesic effects**

When evaluated using the carrageenan-induced paw oedema technique in rats, ethanol extract of *M. koenigii* leaf, along with methanol extracts, and others, shown strong anti-inflammatory and analgesic properties. Further research revealed that *M. koenigii* leaf extracts efficiently reduce pain in rats caused by intraperitoneal acetic acid and subplantar formalin injection. Ethanol extracts (at 300 and 400 mg/kg) also function as antihistamines and can stabilize mast cells.²⁶

➤ **Anthelmintic activity**

The ethanolic and aqueous extract of the leaves exhibits an anthelmintic action against *Pheretima posthuma* that is comparable to the prescription medication Piperazine, indicating that the leaves have anthelmintic properties. The polyphenolic component called tannins, which is present in the leaves of *M. koenigii*, is thought to have antihelminth properties. In addition to acting by binding tannins to free proteins in the host's gut or to glycoproteins on the parasite's cuticle, the methanolic extract of *M. koenigii* exhibits dose-dependent anthelmintic effects against the Indian earthworm (*P. posthuma*). These actions have a lethal effect on the parasite. The Indian earth worm is rendered paralyzed after 18 minutes by the methanolic extract, and it becomes fatal after 45 minutes.²⁷

➤ **Inotropic activity**

The isolated frog heart exhibits a positive inotropic effect in response to the ethanolic extract of fresh *M. koenigii* leaves, with the effect being dose dependant. It was suggested that an increase in the *M. koenigii*'s ease of using calcium from the extracellular locations would result in the positive inotropic activity.²⁷

➤ **Immunomodulatory activity**

The leaf extracts have been shown to have anti-diabetic properties as well as guaranteed effects on immunology associated to the metabolism of oxidative stress. Interleukin (IL)-2, 4, 10, and tumour necrosis factor alpha (TNF-alpha) expression were indicative of this immunomodulatory and anti-inflammatory action.²⁷

Pharmacological Properties of *M. koenigii*²⁸

Table 5 shows Pharmacological Properties of *M. koenigii*. It shows Anti-inflammatory, Anti-helminthic, Anti-cancer, Hypocholesterolemic, Antidiarrheal, antidiabetic and so on activities.

Table 4 Pharmacological Properties of *M. koenigii*

Pharmacological Activity	Plant part	Extract
Anti-inflammatory	Leaf	Ethanol, Petroleum ether, Chloroform, methanol
Anti-amnesic	Leaf	Petroleum ether
Hypocholesterolemic	Leaf	Ethanol
Memory enhancer	Leaf	petroleum ether
Anti-helminthic	Leaf	Alcoholic
Anti-bacterial	Bark, Leaf	Petroleum ether, Alcohol
Anti-cancer	Stem bark	Petroleum ether
Anti-diabetic	Whole plant, fresh leaf, fruit.	Aqueous, methanol
Antidiarrheal	Seeds	n-hexane
Anti-fungal	Leaf	Petroleum ether, alcohol and Acetone
Radioprotective and Chemoprotective	Leaf	Methanol
Analgesic and Antinociceptive	Leaf	Methanol
Anti-oxidant	Leaf	Methanol and Aqueous
Cardiovascular	Leaf	Aqueous
Anti-lipid peroxidative	Leaf	Methanol
Anti-tumor	Leaf	Petroleum ether

Ethnobotanical profile of *M. koenigii*²⁹

Table 6 shows ethnobotanical profile of curry leaves. It includes various ethnobotanical uses of the plant. The uses are depending on the part of plant, such as whether it is whole plant, stem, bark, leaves or any other part of plant.

Table 5 Ethnobotanical profile of Curry leaves

Sr.no.	Plant part used	Ethnobotanical uses
1.	Whole plant	Used as Stimulant Hair tonic Blood purifier Antidepressant Antidysenteric Antidiarrheal Antifungal Anti-inflammatory Antiemetic Febrifuge Stomachic Anti-periodic To cure Diabetes mellitus Leukoderma Body aches Kidney pain Vomiting
2.	Stem	Used as Datum for cleaning, strengthen gums and teeth
3.	Bark	Used as Hair tonic, Stomachic and Carminative
4.	Leaves	Used as Stomachic Purgative Febrifuge Anti-anemic Anti-helminthic

		<p>Analgesic Anti-ulcer Antiamnesic, Hair tonic, Stimulant of hair growth</p> <p>To cure Bruises and Eruption Night blindness Vomiting Bites of poisonous animals Hypercholesterolemia lightening</p> <p>For Flavoring Seasoning Memory enhancing Maintaining the natural skin Pigmentation and showed skin lighting and rough skin improving Losing weight</p>
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Qualitative test for *M. koenigii* leaves extract³⁰

Table 6 Phytochemical tests (Screening) of Curry leaves

Sr. No.	Reagent	Alcohol Extract	Ether Extract	Microwave assisted extract
1.	Detection of Alkaloids			
A.	Mayer's test	-ve	-ve	-ve
B.	Wagner's test	+ve	+ve	+ve
C.	Hager's test	+ve	-ve	+ve
2.	Detection of carbohydrate			
A.	Molisch test	+ve	+ve	+ve
B.	Fehling's test	+ve	+ve	+ve
C.	Benedict test	-ve	-ve	-ve
D.	Barford's test	+ve	+ve	-ve
3.	Detection of Glycosides			
A.	Borntrager's test	-ve	-ve	-ve
B.	Legal's test	-ve	-ve	-ve
4.	Saponin			
		-ve	-ve	+ve
5.	Detection of proteins and amino acid			
A.	Millon's test	+ve	+ve	+ve
B.	Nitric acid test	-ve	+ve	+ve
C.	Biuret test	-ve	-ve	+ve
D.	Ninhydrin test	-ve	-ve	+ve
6.	Detection of phenolic compound and tannins			
A.	Ferric chloride test	+ve	+ve	+ve
B.	Gelatin test	-ve	+ve	+ve
C.	Lead acetate test	+ve	-ve	+ve
D.	Alkaline reagent test	+ve	-ve	+ve

Table 7 indicates various standard phytochemical tests available for curry leaves. These varieties of tests are used to identify number of active constituents that are present in curry leaves. These actives may include alkaloids, glycosides, proteins, amino acids, tannis, saponins and various phenolic compounds.

Conclusion

Curry leaves are green vegetables in the Rutaceae family. The plant's numerous important pharmacological properties include its heart-healthy effects, its ability to lower cholesterol and blood sugar, its antibacterial, antiulcer, and antioxidant properties, as well as its cytotoxic, antidiarrheal, and phagocytic effects. Numerous medical uses exist for almost every part of the plant. Vitamin A, vitamin B complex, vitamin C, proteins, fibres, and carotene are all abundant in the leaves. The existence of monoterpene hydrocarbons, oxygenated monoterpenes, and sesquiterpenes, which are in charge of its numerous pharmacological qualities, is confirmed by a review of its phytochemical profile. For this reason, we need to spark interest in this plant's research in order to find new drugs. For improved applications down the road, it is imperative that pharmaceutical sciences make the most of its full potential.

REFERENCES

1. Ajay S, Rahul S, Sumit G, Paras M, Mishra A, Gaurav A. Comprehensive review: *Murraya koenigii* Linn. Asian J Pharm Life Sci. 2011; 2231:4423.
2. Goel A, Sharma A, Kulshrestha S. A phytopharmacological review on *Murraya koenigii*: an important medicinal plant. Int J Pharm Sci Rev Res. 2020 May;62(2):113-119.
3. Chauhan B, Dedania J, Mashru RC. Review on *Murraya koenigii*: versatile role in management of human health. World Journal of Pharmacy and Pharmaceutical Sciences. 2017 Jan 9;6(3):476-493.
4. Igará CE, Omoboyowa DA, Ahuchaogu AA, Orji NU, Ndukwe MK. Phytochemical and nutritional profile of *Murraya koenigii* (Linn) Spreng leaf. Journal of Pharmacognosy and Phytochemistry. 2016;5(5):07-09.
5. Chaudhary A. A review on the culinary uses and therapeutic properties of *Murraya koenigii*. Journal of Advancement in Pharmacognosy. 2020;1(1):1-8.
6. Iyer D, Devi U. Phyto-pharmacology of *Murraya koenigii* (L.). Pharmacognosy Reviews. 2008;2(3):180.
7. Gahlawat DK, Jakhar S, Dahiya P. *Murraya koenigii* (L.) Spreng: an ethnobotanical, phytochemical and pharmacological review. Journal of Pharmacognosy and Phytochemistry. 2014;3(3):109-119.
8. Dhongade H, Sawarkar H, Muley B, Deshmukh V, Pande A. Therapeutic potentials of *Murraya koenigii* Spreng (Rutaceae). American Journal of Pharm Research. 2013;3(9):7399-7412.
9. Reeta M, Ravindra S, Sharma T, Sumit N, Kotecha M. Macro and Microscopic study of meetha neem (*Murraya koenigii* linn). World Journal of Pharmaceutical Research. 2015 Jun 30;4(09).
10. Franyoto YD, Nurrochmad A, Fakhruddin N. *Murraya koenigii* L. Spreng.: An updated review of chemical composition, pharmacological effects, and toxicity studies. Journal of Applied Pharmaceutical Science. 2024 Apr 9.
11. Goyal P, Chhabra R, Vij L. Ethnobotany, Phytochemical, Pharmacological Potentials of *Murraya koenigii*, and Its Health Benefits—A Review. Current Journal of Applied Science and Technology. 2020 Sep 1;39(26):29-38.
12. Malode GP, Parbat AY, Shaikh AR, Panchale WA, Manwar JV, Bakal RL. Phytochemistry, pharmacology and botanical aspects of *Murraya Koenigii* in the search for molecules with bioactive potential-A review. GSC Advanced Research and Reviews. 2021 Mar 30;6(3):143-55.
13. Gupta P. A review on therapeutic use of *Murraya koenigii* (L.) Spreng. Int. Res. J. Mod. Eng. Technol. Sci. 2020; 2:93-97.
14. Shaikh H, Shaikh S, Rao P. A review on Indian Traditional herb *Murraya koenigii* its nutritive and medicinal properties in Human health management. W JPR. 2020 Apr 1;9(6):850-863.
15. Al Harbi H, Irfan UM, Ali S. The antibacterial effect of curry leaves (*Murraya Koenigii*). EJPMR. 2016; 3:382-387.
16. Handral HK, Pandith A, Shruthi SD. A review on *Murraya koenigii*: multipotential medicinal plant. Asian Journal of pharmaceutical and clinical research. 2012 Nov;5(4):5-14.
17. Gahtori K, Aggarwal C, Tyagi M, Bajpai AB, Srivastava N, Singh S, Singh S, Gaurav N. Review on *Murraya koenigii*: Dietary Supplements and Highly Prosperous Plants of Pharmacological Value. The Scientific Temper. 2022 Jun 25;13(01):108-114.
18. Jain M, Gilhotra R, Singh RP, Mittal J. Curry leaf (*Murraya koenigii*): A spice with medicinal property. MOJ Biol Med. 2017;2(3):236-256.
19. Nishan M, Subramanian P. *Murraya koenigii* (curry leave)-A review on its potential. Int. J. PharmTech Res. 2015;7(4):566-72.
20. Patel A, Mishra A. A review on pharmacological activity of *Murraya Koenigii* and their effective doses. Journal of Medical Pharmaceutical and Allied Sciences. 2013;2(01):1-09.
21. Bisht J, Rashmi R, Naveen G. Phytochemical analysis and antibacterial activity of different leaf extracts of *murraya koenigii*. International Journal of Biochemistry and Biomolecules. 2016 Dec 30;2(2):29-33.
22. Reddy BM, Dhanpal CK, Lakshmi BV. A review on curry leaves (*Murraya koenigii*): versatile multi-potential medicinal plant. International Journal of Advances in Pharmacy Medicine and Bioallied Sciences. 2018;6(1):31-41.
23. Saini SC, Reddy GB. A review on curry leaves (*Murraya koenigii*): Versatile multi-potential medicinal plant. Am J Phytomed Clin Ther. 2015;3(4):363-8.
24. Kumar SR, Loveleena D, Godwin S. Medicinal property of *Murraya koenigii*-a review. International Research Journal of Biological Sciences. 2013 Oct 9;2(9):80-3.
25. Ilangovan SS, Krishna P, Koushika Das SS. A review on anti-microbial properties of *Murraya Koenigii*. American Journal of Pharmaceutical Research. 2016;6(12).



26. Tiwari S, Talreja S.A Pharmaceutical Importance of *Murraya Koenigii*-A Complete Study. Indian Journal of Public Health Research & Development. 2020 Oct 21;11(11):276-84.
27. SHOBANA K, Sethuraja T, Ananthi SS. A review and its potential of *Murraya koenigii*. World Journal of Advanced Research and Reviews. 2022;16(2):935-41.
28. Singh S, More PK, Mohan SM. Curry leaves (*Murraya koenigii* Linn. Sprengal)-a miracle plant. Indian Journal of Scientific Research. 2014;4(1):46-52.
29. Asema SU, Shaikh AA, Farooqui M, Fatema S. Phytochemical analysis of *Murraya koenigii* leaves extract and its biological activity. The International Journal of Analytical and Experimental Modal Analysis. 2021;3(1):1798-801.
30. Verma S. Overview study on *Murraya koenigii* (mitha neem): Rutaceae. Journal of Drug Delivery and Therapeutics. 2018 Jul 14;8(4):90-2.

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