

# A Pharmaceutical Importance of *Murraya Koenigii*- A Complete Study

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## Abstract

*Murraya Koenigii* is a multipurpose plant. Its belong to the rutaceae family. The plant is commonly known as Curry Leaf/Kari pataa or Meethi neem. The plant is a native of India. It is distributed/found in tropical and sub-tropical regions in the world. All parts of plant is useful for treat and cure various diseases and useful for preparation of pharmaceutical formulations, cosmetic preparation. The plant contains many major phytochemical compounds, Vitamins, Nutrients. it is also a rich source of nutrient and minerals (K, S, Ca, Zn, Fe, Mg) due to the presence of these major chemical compounds the plant contains many pharmacological activity like anti-inflammatory, anti-pyretic, hypoglycaemic, anti-ulcer, wound healing, hypocholesterolemic, anti-oxidant, useful for memory enhancing and some other uses includes insecticidal, anti-microbial, anti-fungal etc. The main goal of this study was to convey the information about plant benefits/use for pharmacological and nutritive purpose.

**Key words:-** *Murraya Koenigii*, Pharmacological uses

*Murraya Koenigii* is commonly known as Curry Leaf/Kari pataa or Meethi neem. Its belonging to Rutaceae Family <sup>(1)</sup>. The plant is an Native of India, Sri Lanka and some other countries <sup>(2)</sup>. It is widely distributed and cultivated in India and also found in Assam, Bengal, Himalaya's, Uttarakhand, Thiru-Kochi (state of India) and some other Regions like western Ghats, Moist forests of Asian Regions, Bhutan, Nepal, Thailand, Pakistan etc <sup>(1,3)</sup>. The plant possess a aromatic odour. It contains a small shrub or the plant height up to 6 m <sup>(4,5)</sup>. It is a fast growing plant and contains a dark green colour leaves. Curry leaves contains a many chemical constituent which possess a many pharmacological/biological activity, nutritive property, aromatic property. Some chemical constituents are-  $\alpha$  - caryophyllene,  $\delta$  - elemene,  $\beta$ - elemene,  $\alpha$  &  $\beta$ - phellandrene due to the presence of these compounds the plant ability to prevent food spoilage. some other compounds includes cis- $\beta$ -

ocimene, cis-Piperitol, Linalool,  $\gamma$ -Terpinene, Terpinyl acetate, m-Cymene,  $\alpha$ -Terpinene,  $\beta$ -Myrcene, Camphene,  $\alpha$ -Thujene, Eucalyptol, Caryophyllene oxide. The plant also in rich source of girinimbiol, girinimbine (carbazole alkaloids), koenine, koenigine, koenidine, calcium, phosphorus, iron, thiamine (vitamin B1), riboflavin (vitamin B2), niacin (nicotinic acid), sitosterol, carotene, 1,4 methanoazulen-9-ol, Caryophyllene oxide, Phytol, pinene, phenolic compounds etc <sup>(3,6,7)</sup>.

The plant leaves is widely used in Indian culture for cooking Purpose (used as a flavouring agent in curry, chutney, pulse etc), useful for its aromatic property. The plant parts (Leaves, root, seed) from centuries year ago beneficial for traditional medicinal use such as useful for bite of poisonous animal, tonic used as stomachic, leaves and roots useful to cure external eruption/wound, blood purifier, dysentery <sup>(3,8)</sup>. According to various research reports *Murraya koenigii* roasted leaves are used as a anti emesis, the paste of the leaves mixed with buttermilk and daily consumed orally for stomach-ache. The plant parts is also beneficial for the treatment of deficiency of calcium and vitamins due to the presence of vitamins (vitamin A, vitamin B & C), Calcium source, Iron in plant. The leaves paste is apply on the boils/furuncle

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(painful pus filled bump in skin) for reducing pain and Inflammation, Prevent cataract, curry leaves is also useful for retained black colour in hair. Juice of roots is useful to cure Renal/Kidney pain <sup>(1,9)</sup>.

Numerous researchers study Reported the Plant are useful to cure and treat various diseases because all parts of plant contains a many Important chemical constituent which exhibit many pharmacological activity such as the Raw leaves of plant is useful to cure diarrhoea, vomiting, stomach pain, Leaves and root of plant are used to treat and cure Piles, anthelminthic, leucoderma (white patches in

skin), blood disorder and also possess anti-inflammatory property, analgesic property, antibacterial property, anti cancer, antimicrobial activity, anti oxidative property and useful for reducing cholesterol level (hypolipidemic activity), anti hypertensive activity and also possess anti-diabetic property etc<sup>(10,4)</sup>. According to researchers study shown the plant also useful for making some important medicinal drug such as vinblastine, vincristine (drugs useful for cancer treatment), aspirin, quinine (used as a anti-malarial drug) <sup>(2,11)</sup>.

**Taxonomical/Scientific Classification of *Murraya Koenigii* <sup>(12,13,14)</sup>**

Category	Botanical description
Kingdom	Plantae
Subkingdom	Tracheobionta (vascular plant)
Superdivision	Spermatophyta (seed plant)
Division	Magnoliophyta (flowering plant)
Class	Magnoliopsida
Subclass	Rosidae
Order	Sapindales
Family	Rutaceae
Genus	Murraya
Species	Murraya Koenigii

**Vernacular name of *Murraya koenigii* (12,13,15)**

English	Curry leaves
Kannada	Karibevu
Hindi	Karipatta, Mitha neem
Tamil	Kariveppilai
Malayalam	Kariveppu
Marathi	Kadhilimb
Sanskrit	Girinimba
Telugu	Karepeku
Tulu	Bevusoppu
Russian	Listya karri
Spanish	Hojas de curry
Italian	Fogli di Cari
French	Feuilles de Cari
German	Curryblatter
Guajarati	Mitho limado
Danish	Karry bald
Dutch	Kerriebladeren

**Morphological characteristics of plant parts (13,15,16)**

**Plant Parts :- Bark, Leaves, Fruit, Flowers, Root, Seeds etc.**

1) **Bark:** - The Main Bark of the plant is dark brown in colour and the longitudinal bark is peeled off and the bark colour is white in beneath. The plant contains a height up to 6m long and diameter is 15-20 cm.

2) **Leaves:** - The plant leaves exhibits very strong aromatic odour, leaves are dark green in colour, leaves are 2.5-4.5 cm long, lanceolate ovate shape with oblique base, Each rachis of leaf is 15-30 cm long and each rachis contain 11-24 leaflets. the plant leaves are arranged in bipinnately.

3) **Flower:** - The plant contains a small white flower, which arranged in a small panicles, funnel shaped, exhibits aromatic odour. Each terminal cyme carry 60-90 flowers. Flower diameter is 1-1.2, long up to 1.4-1.6 cm and the plant flower is bisexual.

4) **Fruit:** - fruit are oblong/ovate in shape, 1.4-1.6 cm long, diameter is 1-1.2 cm. The fully ripe fruit of plant are black in colour with shining surface and the no. of fruits per bunch/cluster differ from 32-80.

5) **Seed:** - The plant each fruit contains a seed which colour is spinach green, long up to 11mm, diameter is 8mm.

**Flowering time & Fruiting time:** - The flowering time of plant is April- last May and the fruiting time of plant is July- August<sup>(17)</sup>

**Phytochemistry and Uses of *Murraya koenigii* plant part**<sup>(17,12)</sup>

All parts of this plant contains a major bioactive compounds which is beneficial for the medicinal/ pharmacological activity, nutritive property, used as a flavouring agent and prevent food degeradation (used as a food preservative) detailed discussed in below:-

**Part used:-** Leaves, root, bark, fruit, seed etc

1) **Leaves:-** leaves of the plant contains many bioactive chemical compounds which possess many useful effect for treat and cure various diseases. Some important chemical constituent are:- **Calcium, Oxalic acid Glycosides, Carbazole alkaloids like koenigin,**

**girinimbin, mahanimbin, koenine, koenimbine, O-methyl murrayamine, O-methyl mahanine, iso mahanine, bis mahanine, bis pyrayafoline, murrayazoline, murrayazolidine, Euchrestine, Tannins, Tocopherol, Lutein** and leaves of plant also a rich source of **protein, carbohydrate, fibers, vitamin (vitamin A, B, C), minerals, phenolic compounds, steroids, saponins, Flavonoids** etc due to the presence of these compound plant possess many pharmacological uses such as Anti-oxidant, anti-ulcer, anti-diabetic, ant-tumour, anti-cancer, anti-asthmatic, anti-inflammatory, neuroprotective, memory enhancing, anti emesis, larvicidal, insecticidal, used as a flavouring agent etc.

2) **Root:-** Root extract of this plant also contains many phytochemical compounds which is beneficial for its pharmacological and nutritive activity. some important phytoconstituents are:- **carbazole alkaloids** such as **murrayanol, mahanine, murrayagetin, bismahanine, mahanimbin** etc. Root extract is used as a stimulant and anti inflammatory etc.

3) **Bark:-** Bark of the murraya Koenigii plant contains various chemical constituents such as **murrayanine, girinimibine and mahanimbine, murrayazolinine, murrayazolidine, murrayacinine, mukonidine, mahanimbinol, murrayazolinol, carbazole alkaloid, girinimbinol and mahanimbilol and carbazole carboxylic acids (mukoeic acid & mukeic acid)** and the presence of these chemical compounds the bark of plant is also useful for treat various diseases such as **Ulcer, Apoptotic, Cancer, Tumour, used as anti-oxidant** etc.

4) **Fruit:-** Fruit contains many chemical compounds includes **Carbazole alkaloids (Isomahanine, murrayanol, mahanimbine and girinimbine, murrayazolidine, koenimbine and mahanine), niacin, leucin, alanine** and the fruit pulp contains **Sugar (reducing sugar), Tannins, vitamin C, minerals (potassium, magnesium, calcium, iron), proteins** etc. It possess many pharmacological activity **hypoglycaemic activity, apoptotic activity**, such as fruit pulp of plant exhibits **Free radical scavenging property** etc.

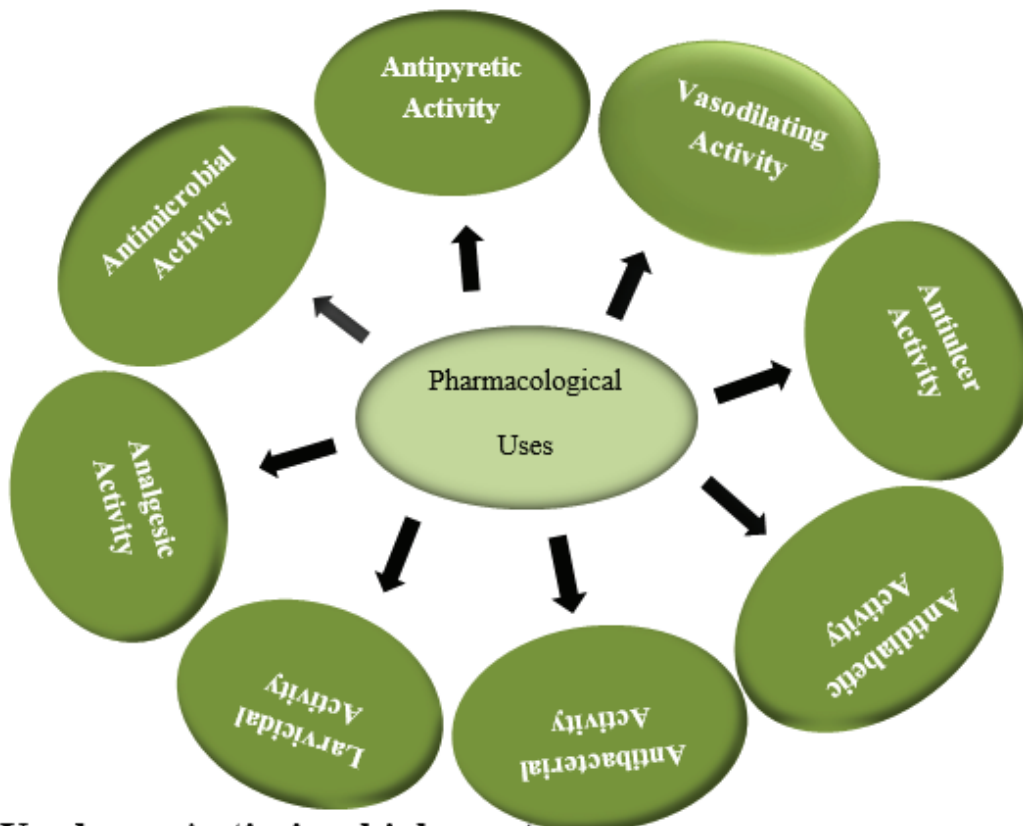
5) **Seed:-** seed of the plant contains various carbazole alkaloids includes **mahanimbine, girinimbine, isomahanine, mahanine, kurryam,**

koenimbine and lipids and it is useful in the treatment of diarrhoea etc.

Pharmacological use of *Murraya Koenigii*

The plant parts also possess various pharmacological activity/Medicinal property discussed below:-

Ø Used as a Antimicrobial agent



➤ Used as a Antimicrobial agent

The root extract of *murraya koenigii* with hexane, methanol, chloroform extract are tested against some microbes such as *Escherichia coli (E.coli)*, *Staphylococcus aureus*, *Bacillus subtilis*, *Salmonella typhi* and strain of *Candida albicans*, *Trichophyton rubrum*, *Aspergillus niger*. Results shown the hexane, methanol, chloroform extract of root of this plant possess anti-microbial activity. The study also shown the methanol extract of root of this plant more effective against microbes compare to other extract compounds and possess maximum inhibitory activity on microbes such as *Staphylococcus aureus*, *Trichophyton rubrum*.

In another study shown that the aqueous extract of the root of this plant are not effective against micro-organisms<sup>(14)</sup>.

Ø Plant possess Antipyretic activity

The ethanolic leaves extract of *murraya koenigii* also exhibits antipyretic activity. The study found to the ethanol extract of leaves is more beneficial compare to other extract such as petroleum ether, chloroform extract of leaves<sup>(14)</sup>.

Ø Used as a Antidiabetic Agent

The Petroleum ether extract of *Murraya Koenigii* contains mahanimbine chemical compound. In study the mechanism of mahanimbine shown it is useful for reduces the blood sugar level and potentiate/increase the level of insulin by improving the pancreatic secretion of insulin from  $\beta$ - cells. Another research study shown that the mahanimbine chemical compound also exhibit inhibitory effect against  $\alpha$ -amylase in compared to

acarbose (anti-diabetic drug) <sup>(12,18)</sup>.

Ø Useful to prevent Alzheimer disease/dementia

Numerous study shown that the plant leaves contain many alkaloids. These alkaloids useful for maintaining the anti-oxidants include glutathione peroxidase, glutathione reductase, superoxide dismutase, catalase in brain.

In another study shown the plant also beneficial for decreases the lipid peroxidation and nitric oxide. And induce ACH/Acetylcholine (Chemical messenger) secretion and reduce anticholinesterase (decreases breakdown of ACH). According to this study the researchers proved that the plant is useful for prevent the neurodegenerative diseases includes Alzheimer disease etc <sup>(19)</sup>.

Ø *Murraya koenigii* plant possess Hypo-cholesterolemic activity

The ethanolic extract of plant leaves contains various major phytochemical compounds (Carbazole alkaloids) which is useful to cure and treat various diseases and the ethanol extract also exhibit hypocholesterolemic property (reduce level of cholesterol) which was studied in elder mice they observed the level of cholesterol is reduced in mice and also found the 500mg/kg dose is more effective compare to the hypocholesterolemic drug such as simvastatin <sup>(12)</sup>.

Ø Plant is useful to prevent cardio vascular diseases

According to study the plant contains a various major bioactive chemical compounds includes carbazole alkaloids due to the presence of these compound the plant possess a vasodilating activity, hypocholesterolemic activity and anti-oxidant activity. Leaves of the plant is useful for prevent the cholesterol oxidation from bad cholesterol/LDL (low density lipoprotein) and helpful for induce the level of good cholesterol/HDL (high density lipoprotein) due to this pharmaceutical activity the plant is useful for protect body against atherosclerosis (cardio vascular disease) <sup>(20)</sup>.

Ø Useful for Skin pigmentation

The leaves oil of this plant possess sun protection factor (SPF) property (useful for protect skin against

sun burn), cream of the *murraya koenigii* plant useful against skin pigmentation, erythema (skin redness). And cosmetic industries also use of this plant for making formulations such as cream, lotion, soap and add some other additives for enhance/increase product efficacy <sup>(12)</sup>

Ø Plant possess Antiulcer property

According to the researchers reports study shown that the aqueous extract of leaves of this plant effective against gastric ulcer in rats models (induced gastric ulcer in rat by using ethanol, aspirin, cold restrain, pylorus ligation(stimulation of acid output in rat) etc) and the animal is pre-treated with the aqueous extract of ethanol the evaluation shown the significant reduction of ulcer activity in rats <sup>(12,21)</sup>.

Ø Plant exhibits Anti-diarrhoeal property

The n-hexane extract of the seeds of *murraya koenigii* plant contains many major bioactive compounds such as carbazole alkaloids, kurryam, koenimbine, koenine etc. These compounds exhibit inhibitory effect/activity against diarrhoea (induced by castor oil & PGE 2/Prostaglandin 2) in rats. The charcoal meal test shown the compound also useful for the decrease/reduced motility in GI in wister rats <sup>(12)</sup>.

Ø Used as a Antibacterial agent

*Murraya koenigii* plant extract possess anti-bacterial activity against some bacteria includes *Bacillus cereus*, *Escherichia coli* (*E.coli*), *Staphylococcus aureus*, *Salmonella typhi* (*S.typhi*). The ethanol, methanol and acetone extract of plant shown the significant effect against these bacteria strain.

The acetone extract of plant shown maximum effect against *Bacillus cereus* and the methanol extract shown high inhibition efficacy compare to ethanol extract. Moreover, methanol extract shown less inhibition efficacy against *E.coli*, while acetone extract shown higher inhibitory effect compare to methanol extract <sup>(22)</sup>.

Ø Useful for Wound Healing

The Ethanol leaves extract of plant possess wound healing property. The researchers study has found in albino rat, male albino rat is sacrificed and applied the extract in wounds after some day the study showed decrease the wound affected inflammation in day by

day. Hence, the study proved that the plant leaves extract exhibit wound healing activity<sup>(22)</sup>.

#### Ø *Murraya koenigii* possess Analgesic activity

The methanol extract of leaves of this plant possess analgesic property, According to numerous researchers study, The inflammation is induced in rat by using formalin (formaldehyde solution is subcutaneous injected in rat paw to induce pain/inflammation). Methanol extract of leaves were taken in different doses (100mg/ml, 200mg/ml & 400 mg/ml) and the 400mg/ml (dose) shown significant effect against pain/inflammation. Hence the study proved that the methanol extract of leaves of *murraya koenigii* plant exhibit analgesic activity<sup>(22)</sup>.

Ø Plant possess Antiprotozoal and anti-hypertensive activity

*Murraya koenigii* ethanol leaves extract of plant possess antiprotozoal & antihypertensive both activity. The study shown that take the variety of extract of these plant such as extract A (contains whole plant except roots) and extract B (contains only roots of plant). And after evaluation of extract the study found extract A possess anti protozoal activity against *Ent amoeba Histolytica* in ileum of guinea pig, while extract B exhibits both activity such as antihypertensive activity and antiprotozoal activity in cat or dogs<sup>(16,23)</sup>.

#### Ø *Murraya koenigii* useful for Haematological property

The whole plant is useful for the haematological study. According to researchers study that found the normal human intake dose administered in rat and after administration the study not shown any adverse effect and no adverse effect on counts of RBC, WBC, haemoglobin, total serum protein, Fibrin level, blood urea and no any histopathological (disease on tissue/cell) changes in rat liver. Hence, the study proved that the plant possess no any adverse effect<sup>(7)</sup>.

#### Ø Useful for treatment of Respiratory diseases

The plant contains major bioactive chemical constituents with piper plant extract useful for the treatment of respiratory/bronchial disorders<sup>(16)</sup>.

#### Other Important uses of *Murraya Koenigii*

##### Ø *Murraya koenigii* Useful for Larvicidal (Kill larvae) activity

The Acetone and petroleum ether extract of plant leaves take a 250-900ppm concentration range possess larvicidal activity against *A.aegypti*<sup>(16)</sup>.

##### Ø Plant is a rich source for nutrition

The plants parts is a rich source of minerals, vitamins, Proteins, Carbohydrate, carbazole alkaloids and amino acids etc. The plant leaves also contains a Nitrogen, phosphorus, sulphur, potassium, sodium and also contains polyunsaturated fatty acid (linoleic acid).

Numerous researchers report shown that the leaves extract of plant contains a significant amount of fibers, calcium, iron, phosphorus and The plant green leaves also used in deficiency of micronutrient because its contains a considerable amount of micronutrient<sup>(24)</sup>.

##### Ø Used as a Food Preservative

*Murraya koenigii* plant berry extract contains a many bioactive compounds (carotene, flavonoids, phenolic compounds) which possess a anti oxidative property and due to the presence of these compounds the plant prevent the oxidation process in food and also useful for maintain the quality for food includes flavour(used as a flavouring agent in meats, curries), texture of food, prevent rancidity, exhibits antimicrobial property. Hence, its proved the plant is useful for prevent food deterioration<sup>(24)</sup>.

##### Ø Ethno botanical use of *Murraya Koenigii*<sup>(15)</sup>

· The fresh leaves or leaf powder is used as a flavouring agent and prevent degradation in curries, meats, soups, dishes etc. and the leaves of plant also useful for decoration of dishes.

· Boil the fresh leaves with coconut oil is used as a hair tonic. useful for hair growth and retain its black colour.

· The leaves oil is useful in cosmetic industry for making soaps, perfumes, other cosmetic products.

· The fresh leaves plant is apply on skin inflammation, Rashes, wounds for prevention.

The extract of leaves is possess antiemetic property and the leaves and plant possess many pharmacological activity includes anti-inflammatory activity, blood purifier, anti- hypertensive activity, hypoglycaemic activity, useful for renal pain, stomach ache etc brief discussed in above.

The fresh leaves paste is applied on animal bite from the body for remove poison and inflammation.

### Conclusion & Discussion

The Present study/review describe that *Murraya Koenigii* Plant contains many phytochemical chemical constituents and also a rich source of nutrients, minerals and vitamins. which is beneficial for treat and cure several diseases or disorder and due to the presence of major bioactive compound Plant exhibits many major pharmacological activities such as hypolipidemic activity, anti-hypertensive activity, anti-diabetic property, anti-inflammatory activity, analgesic activity, antibacterial activity, anti- diarrhoea property etc. It is a multipurpose evergreen medicinal valued plant. It is a native of India. The plant leaves is widely used in Indian culture for cooking Purpose.

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**Conflict of Interest-** Nil

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