REVIEW ARTICLE e-ISSN: 2349-0659 p-ISSN; 2350-0964

A Review on Pharmacognosy, Phytoconstituents, Pharmacological Activities of *Murraya koenigii* Plant

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Abstract

Nature is the main source of supplements that one human needs. Some of the traditional medicines systems such as Ayurveda, Siddha, Unani, and Chinese belong to the medicines that obtained from natural sources and all human may depend upon that medicines from the ancient times. *Murraya koenigii* is herbal plant belongs to the family Rutaceae. It is commonly known as curry leaves. There is a large range of the plant *M. koenigii* and mostly found in tropical and subtropical regions in the world. The leaves of plants are used in treating piles, inflammation, itching, fresh cuts, dysentery, bruises, and edema. Roots of the plants are purgatives. They are used to stimulate the body and body aches. The bark is used in treating snakebites. The essential oils are extracted from *M.koenigii* leaves that are used in anti-oxidative, hepatoprotective, antimicrobial, antifungal, anti-inflammatory, and nephroprotective activities. The various medicinal properties of *M. koenigii* are depend on their chemical constituents like terpenoids, flavonoids, phenolics, carbohydrates, carotenoids, vitamins, and nicotinic acid from various parts of the *M. koenigii* plant. This review leads to show the various activities, uses, phytoconstituents, description of plant, and preclinical investigations which occurs instead of the studied plant.

Keywords: *Murraya koenigii*, Nephroprotective activities, Phytoconstituents, Supplements

Asian Pac. J. Health Sci., (2022); DOI: 10.21276/apjhs.2022.9.2.49

Introduction

Humans are depend upon natural components since ancient times. The desires of humans are based on shelters, food, supplements, clothing, ingredients flavors, medicine, etc. All the desirable things are mainly obtained from the nature. Nature is the main source of the supplements which one human needs. Some of the traditional medicines systems such as Ayurveda, Siddha, Unani, and Chinese belong to the medicines that obtained from natural sources and all human may depend upon that medicines from the ancient times.[1] The use of ayurvedic medicines is increasing day by day, because of the long-term effect against all type of diseases. Many of the ayurvedic medicines are obtained from the medicinal plants available in nature. Conventional drugs are less effective than that of ayurvedic medicines and also not for a long term. Many of the herbal plants have their medicinal properties, these medicinal properties are due to constituents which may present in the plants like carbohydrates, proteins, enzymes, fats, oils, terpenoids, flavonoids, sterols simple phenolic compounds etc. and having capability to inhibit the diesase. Different classes of the drugs may have different pharmacological actions. These are the sources of income mostly in rural areas for development.[2] According to the WHO, it shows that 80% of the population of developing countries still have trust on ayurvedic medicines for primary care. India has wide range of natural sources which from herbal medicines can be obtained and this applies from old times. Many of new investigations on the medicinal plant may investigates by scientists and many of new research may found every year on the various plants.

Murraya koenigii is herbal plant that belongs to the family Rutaceae. It is commonly known as curry leaves. There is a large range of the plant *M. koenigii* and mostly found in tropical and subtropical regions in the world. Around 14 species exists of the genus of Murraya, and from 14 species only two of them that is *M. koenigii* and *M. paniculate* are found in India.[3] In general, *M. koenigii* is more important because its huge liability of traditional medicinal properties. Anciently, this plant has been used in many forms in Indian Ayurvedic medicine, and found as "krishnanimba."[4] Various parts of the plant *M. koenigii* such as leaves, roots, bark, and fruit, are reasons to give various pharmacological activities. Aromatic constituents present in the leaves of *M. koenigii* are the reason of their flavor.[5] These plants leaves are slightly bitter in taste, smell is pungent and acidic in nature.[6] They are mainly used as treatment of antihelminthics, analgesics, digestives, and appetizers.[7] The leaves of plants are used in treating piles, inflammation, itching, fresh cuts, dysentery, bruises, and edema. Roots of the plants are purgatives. They are used to stimulates the body and body aches. The bark is used in treating snakebites.[8] The essential oils are extracted from *M. koenigii* leaves that are used in anti-oxidative, hepatoprotective[9] antimicrobial, antifungal[10,11] anti-inflammatory, and nephroprotective activities.[12,13] The various medicinal properties of *M. koenigii* are depend on their chemical constituents such as terpenoids, flavonoids, phenolics, carbohydrates, carotenoids, vitamins, and nicotinic acid from various parts of the *M. koenigii* plant.

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How to cite this article: Singla S, Sharma A, Goyal S, Kumari C. A Review on Pharmacognosy, Phytoconstituents, Pharmacological Acivities of *Murraya koenigii* Plant. Asian Pac. J. Health Sci., 2022;9(2):243-250.

Source of support: Nil

Conflicts of interest: None

Received: 05/11/2021 **Revised:** 07/12/2021 **Accepted:** 29/01/2022

The leaves of this plant have been utilized generally in Indian culinary and the compound substance which answerable for its sweet-smelling trademark is P-gurjunene, P-caryophyllene, P-elemene, and O-phellandrene[14] The presence of β-pinene,β-caryophyllene, β-phellandrene, and α-pinene has the capacity to control the food deterioration either alone or by combination. The creator expresses that the three distinctive morphotypes of *M. koenigii* present a unique force in its character. The standard kind *of M. koenigii* is the quickest developing plant with attractive leaves and with dull green in shading. The bantam sort develops as bush and branches are spread and seems such as thick and the leaves are in light green in shading with minimal taller such as standard sort and represents its own fragrance. The earthy colored sort is the most fragrant one, with thick and littlest leaf structure and in dim brown in color [Table 1 and Figure 1].[15]

Different Names

- English-Curry leaves
- Kannada-Karibevu
- Hindi-Karipatta,Mithanim
- Tamil-Kariveppilai
- Malayalam-Kariveppu
- Marathi-Kadhilimb
- Sanskrit-Girinimba
- Telugu-Karepeku.

Conventional Uses

Fundamental oils and new leaf powder of *M. koenigii* are helpful in preparing food things and getting ready to eat food varieties. Attributable to the higher antimicrobial exercises of the fundamental oil from leaf extricates.[17,18] This oil can likewise be utilized as fragrance and flavor specialists in customary practice.

Table 1: Taxonomical classification[16]

Kingdom	*Plantae*
Subkingdom	Tracheobionta
Superdivision	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Rosidae
Family	Rutaceae
Genus	Murraya J. Koenig ex L.
Species	*Murraya koenigii* (L.) Spreng.

Figure 1: Plant *Murraya koenigii* (L.) Spreng

New curry leaves are overflowed with a coconut oil blend until they are diminished to a dark buildup to produce an amazing hair tonic for holding an ordinary hair tone and further developing hair development. Curry leaves have a conventional use, either entire or in parts, as antidiarrheal, antifungal, blood purifying, anti-inflammatory, and anti-depressant agents.[19,20]

Therapeutic Uses

M. koenigii has various illness therapeutic exercises, for example, various pieces of the plant, such as the leaves, roots, and bark, can be ready as tonics for inciting absorption and tooting or as antiemetics.[21] After decoction, the leaves become bitter to the taste and are useful in decreasing fever. The juice of the root is given to oversee renal torments. The leaves and roots can be given as an anthelmintic, pain relieving, solution for heaps, body heat reducer, and refreshment and are moreover accommodating in decreasing irritation and tingling. They are additionally valuable in overseeing leucoderma and blood messes. At the point when eaten crude, the green leaves can offer a remedy for looseness of the bowels, and when they are bubbled in milk, the glue has great application possibilities for relieving harmful nibbles and emissions.[22]

Distribution

As indicated by the creator, *M. koenigii* is circulated and developed all through India. It is found from Sikkim to Garhwal, Bengal, Assam, Western Ghats, and Travancore-Cochin. The seeds sprout without restriction under shade or fractional shade. These curry leaves can be seen as in damp timberland of 500–1600 meters " in stature particularly in Guangdong, S Hainan, S Yunnan. Bhutan, Laos, Sri Lanka, Thailand, Nepal, Vietnam. Upon with the South India settlers, the curry leaves show up to Malaysia, South Africa, and Reunion Island.[23]

Phytochemistry

The developed curry leaves comprise 63.2% of dampness, protein which is of around 1.15% of nitrogen, carb 14.6% which is of absolute sugars and complete debris 13.06%. The bioactive parts in curry leaves are oxalic corrosive, sap, carbazole alkaloids and the major bioactive mixtures, for example, the Koenigin, Bicyclomahanimbicine, Cyclomahanimbine, Murrayastine, Coumarine, Koenidine, and pypayafolinecarbazole has significant pharmacological exercises and the significant part of unpredictable oil comprise bicyclomahanimbicine, mahanimbicine.[24]

The structure of unstable mixtures found in the fundamental oil of *M. koenigii* from the state of Sabah, Malaysia as follows; Linalol (0.56%), trans-Sabinene hydrate (0.53%), trans-2-Cyclohexen-1-old(0.48%), cis-2-Cyclohexen-1-old((0.54%), para-Cymen-8-old((10.31%), β-Terpinol (2.52%), trans-Piperitol (0.40%), Chrysanthenyl acetic acid derivation (0.39%), Lavandulyl acetic acid derivation (1.67%), Bornyl acetic acid derivation (1.68%), α-Copaene(0.82%), β-Elemene (0.35%), (Z)-Jasmone (0.11%), β-Caryophyllene (19.50%), Aromadendrene (0.72%), αHumulene (15.24%), Butanedioic corrosive (2.18%), β-Selinene (3.81%), Naphthalene (1.90%), α-Selinene(6.10%), δ-Cadinene (2.03%), Nerolidol (2.64%), trans-Nerolidol (1.32%), Cycloheptane (0.13%), Spathulenol(1.98%), Caryophyllene oxide (2.14%), Viridiflorol (1.51%), 2-Naphthalenemethanol (0.66%),

Trivertal(0.35%), Juniper camphor (1.57%), Cubenol (0.57%), β-Cadina-1(6),4-diene (0.50%), Selina-6-en-4-old((4.78%),Phytol (10.07%).[25]

Pharmacognosy

The presence of significant phytochemicals makes the plant valuable for treating various illnesses and has a capability of giving valuable medications of human use. The quantitative assurance of pharmacognostic boundaries will help for setting principles for rough medications. The absolute debris is especially significant in assessing the virtue of medications. The pharmacognostic constants for the leaves of this plant, the indicative infinitesimal highlights, and the mathematical norms are accounted for, which is valuable for the assemblage of a reasonable monograph for its appropriate distinguishing proof.[26] Tiny and morphological characters were analyzed by pharmacognostic assessment, which likewise incorporates the assurance of leaf content, debris esteem, powder investigation and extractive qualities. Phytochemical screenings including subjective synthetic assessment were moreover performed. The leaf had reticulate venation and dentate edge with uneven base. The stomata were circulated on both the sides. Phytochemicals such as sugars, alkaloids, sterols, tannins, unstable oils, saponins, anthraquinone glycosides, and flavanoids are revealed. The organoleptic characters including shading, scent, taste and outside elements of bark of *M. Koenigii* were noticed.[27]

Pharmacological Activities

Vasodialating Activities

Rough fluid leaf concentrate of *M. koenigii* was arranged which showed a portion subordinate negative chronotropic impact on cardiovascular arrangement of frog heart arrangements which may be because of its immediate activities on the heart and veins. Potassium particle fixation was likewise observed to be truly unimportant by fire photometry, demonstrating no inclusion of potassium particles. The watery leaf extricate has vasodilatory impact which is free of muscarinic, histaminergic, and ß-adrenergic receptor as it expanded the quantity of drops/minute in frog rear appendage perfusion explore and furthermore does not have α-adrenergic receptor hostile movement. The fluid leaf separate showed critical impact at grouping of 1 mg/ml 22. Rough ethanolic concentrate of new leaves of *M. koenigii* showed portion subordinate positive ionotropic impact on a detached frog heart. The reaction to *M. koenigii* 62.5–1000 μg was not impacted in whichever way by theophylline, imidazole, propanolol, and sildenafil. The progressions in potassium and sodium focus did not change. The outcome recommended that *M. koenigii* initiated positive ionotropic impact conceivably by expanding accessibility of calcium from extra cell locales.[28]

Hypocholesterolemic Activity

Hypocholesterolemic movement was checked in matured mice, which was done by utilizing unrefined ethanol concentrate of plant leaves of *M. Koenigii*. The investigation was affirmed by noticing a lessening in cholesterol level in portion subordinate way in matured mice. The portion of 500 mg/kg was seen as more proficient than the 300 mg/kg and was similar with the standard cholesterol lessening specialist, Simvastatin. Carbazole alkaloids are a significant phytochemical constituent of plant found to have different natural exercises such as enemy of oxidant, against diabetic, hostile to microbial, lipid bringing down and so on.[22]

Antiulcer Activity

Antiulcer activity of aqueous and ether extracts of *M. koenigii* was studied in reserpine-induced gastric ulcer model in albino rats. Extracts were effective in gastric ulceration and suggested as protective as ranitidine.[29] Crude aqueous extract of leaves showed anti-ulcer activity which was evaluated using models of acute gastric lesions induced by ethanol-induced, aspirin-induced, cold restrain stress and pylorus ligation in rats. Animals were pretreated with doses of 200 mg/kg and 400 mg/kg of aqueous extract which showed efficient reduction in lesion index, total affected area, and percentage of lesion in comparison with control group in the ethanol-induced, aspirin-induced, cold restrain stress-induced ulcer and pylorus ligation models. These observations provide a confirmation about aqueous extract of leaves of *M. koenigii* can act as good antiulcer.[30]

Antidiarrheal Activity

The bioassay-directed fractionation of the n-hexane concentrate of the seeds of *M. koenigii* brought about the segregation of three unadulterated mixtures of bioactive carbazole alkaloids, Kurryam, Koenimbine furthermore Koenine. Of the three mixtures, Kurryam and Koenimbine have shown critical inhibitory action against castor oil-instigated the runs and PGE2-prompted enter pooling in rodents. The mixtures likewise delivered a huge decrease in gastro-gastrointestinal motility in the charcoal feast test in Wister rodents.[10]

Antibacterial Activity

The fundamental oils from *M. koenigii* leaves showed an hostile to bacterial impact against *Corynebacterium pyogenes*, *Streptococcus aureus*, *Bacillus subtilis*, *Pasteurella multocida,* and *Proteus vulgaris*. The oil was tracked down dynamic against the microbes even at a weakening of 1:500. [31]

Ethanol extraction of leaves, against bacterial strains of Staphylococcus, *E. coli*, *Streptococcus proteus*, *Klebsiella pneumonia,* and *Pseudomonas aeruginosa*. A reasonable zone of hindrance was found if there should arise an occurrence of all strains aside from *K. pneumonia* and *P. aeruginosa*, this was similar to anti-microbials, for example, Amikacin and Gentamycin.[32]

Antifungal Activity

Hostile to parasitic action against *Candida tropicalis*, *Candida albicans*, *Aspergillus treats*, *Aspergillus niger*, *Micro sporumgypseum* was seen by concentrates of *M. koenigii* leaves. The alcoholic concentrate of the leaves affirmed fungitoxicity toward *Rhizoctonia solani* and *Colletotrichum falcatum*. Although methanolic and ethanolic extricates were found successful against mycelia development in *Rhizoctonia solani* and *Fusarium oxysporum* with various efficiency.[33]

Anti-protozoal and anti-trichomonal Activity

Alcoholic concentrates of curry leaves and complete plant (barring roots) showed hostile to protozoal activity against *Entamoeba*

histolytica. Carbazole alkaloids and their results from *M. koenigii* leaves were found to display against trichomonal action in inconsistency of Girinimbin and Girinimbilol with IC50 upsides of 1.07.1.[34]

Antipyretic Activity

Ethanolic extract of *M. koenigii* was reported for a significant antipyretic activity using yeast induce pyrexia in rat model. Rageeb and group in their experiment including albino rats administered alcoholic extract of *M. koenigii* leaves for examination of antipyretic activity using yeast persuaded pyrexia model. The results were comparable to the commercial antipyretic, paracetamol. Alcoholic extract of *M. koenigii* had significant antipyretic effect in PGE1 induced hyperpyrexia in rats.[34]

Antiosteoporotic Activity

Antiosteoporotic activity has been accounted for by leaves. A new carbazole alkaloid 8,8 ″-biskoenigine which is an adjusted dimer of the carbazole and Koenigine was found to be successful in cathepsin B model with IC50 of 1.3 μg/mL.[35]

Inotropic Activity

Positive inotropic impact was contemplated by investegator with the assistance of ethanolic concentrate of leaves in a portion subordinate way, that were been tried on a disengaged frog heart. The increment in the accessibility of calcium from extracellular locales showed the action of passes on to increment withdrawal of the heart and consequently showed positive outcomes for leaves of *M. koenigii* as inotropic specialist.[36]

Mosquitocidal and larvaecidal Activity

Author has detailed Mahanimbine poisonousness in inconsistency of the hatchlings of *Culex quinquefasciatus*. Petrol ether extricates and the $(CH_3)_2CO$ concentrates of *M. koenigii* leaves fill in as larvacide for *Aedes aegypti*. Chloroform and methanol concentrates of *M. koenigii* from stem bark showed solid action against *Aedes aegypti*, a dengue Fever mosquito.[28]

Antioxidant Activity

The green verdant vegetables are known to have a high measure of cancer prevention agents. *M. koenigii* leaves were seen to have the most elevated cancer prevention agent possible when contrasted with four other verdant vegetables. According to the investigations, watery concentrates of *M. koenigii* leaves showed huge insurance component against cadmium actuated harm of heart tissues of the rats. Side impacts of Piroxicam actuated gastric harm in joint patients can be improved by *M. koenigii* was demonstrated by actuating gastric ulcers in rodents and treating them by *M. koenigii*. Benzene part of *M. koenigii* was accounted for to have cancer prevention agent just as antimutagenic action in trial animals.[27]

Antiulcer Activity

The counter ulcer action was noticed utilizing hot watery leaves remove at dosages of 250 and 400 mg/kg. The concentrate created hindrance of gastric sore actuated by antiinflammatory, non-steroidal medications, and pylorus ligation model. The concentrate decreased gastric volume, ulcerative sore, free and complete corrosiveness yet a rise in the pH worth of gastric juice in pylorus ligation model was seen. The outcomes recommended that the concentrate holds huge against ulcer activity.[37]

Antidarrhoeal Activity

The bioassay-directed fractionation of the n-hexane concentrate of the seeds of *M. koenigii* brought about the confinement of three unadulterated mixtures of bioactive carbazole alkaloids, kurryam, koenimbine, and also koenine. Of the three mixtures, kurryam and koenimbine displayed critical inhibitory action against castor oil-incited loose bowels and PGE2-prompted enter pooling in rodents. The mixtures additionally delivered a huge decrease in gastro-gastrointestinal motility in the charcoal dinner test in Wister rat.[10]

Phagocytic Activity

The methanol concentrate of *M. koenigii* leaves was assessed on human oral and cell interceded resistant reaction to ovalbumin, phagocytic movement via carbon freedom test, nitric oxide NO delivery from murine peritoneal macrophages and cyclophosphamide instigated myclosuppression. Phagocytic nature of macrophages was expanded by the increment underway of Nitrite. Remove showed huge expansion in NO creation from peritoneal macrophage at 416 μg/ml and 834 μg/ml with 24% and 56% separately. This movement was confirmed by expansion in Phagocytic list in carbon leeway test.[38]

Analgesic and Antinociceptive Activity

The methanolic concentrate of leaves showed pain relieving impact in hot plate model and formalin incited paw licking reaction in mice. The movement may be connected to the cycles engaged with the counteraction of refinement of nociceptors, down guideline of the sharpened nociceptors or bar of the nociceptors at fringe and focal levels. Methanol removes were taken at various focuses, viz. 100 mg/ml, 200 mg/ml and 400 mg/ml. Among these 400 mg/ml showed productive outcomes.[39]

Anti-lipid Peroxidative Activity

The situation with lipid peroxidation was researched in rodents took care of with *M. Koenigii*. The grouping of melondialdehyde showed a huge decline, while hydroperoxides and formed dienes were altogether expanded in the liver and heart. Glutathione levels in the liver, heart, and kidney were brought down in rodents subsequent to directing this plant. Glutathione reductase, Glutathione peroxidase, GlutathioneS Transferase, SOD, and catalase movement showed a sharp increment.[10]

Wound Healing Effect

Male pale-skinned person rates were utilized to actually take a look at the injury recuperating movement by screening with ethanolic concentrate of leaves of *M. Koenigii*. In the extraction, wound recuperating model uncovers that three gatherings which were taken for wound recuperating action showed a lessening in injury region from one day to another. Entry point model showed a huge

expansion in elasticity of the 12-day injury from a long time ago because of treatment with *M. koenigii*. In this way, the leaves of *M. koenigii* were demonstrated to have critical injury mending limit.[40]

Antiamnesic Activity

Move inertness TL was estimated utilizing raised in addition to show. Standard cholinergic specialist, Piracetam 400 mg/kg was practically identical to the oil ether concentrate of plant leaves 300 and 500 mg/kg in working on the learning and memory of matured mice and was turned around from the impact of scopolamine. A 15 days pre-treatment with petrol ether concentrate of leaves 300 and 500 mg/kg switched the impact of sodium nitrite which was similar with standard Piracetam 400 mg/kg. Subsequently, *M. koenigii* leaves concentrate could be said to further develop the learning capacities of the matured mice in hypoxic condition as demonstrated by a superior presentation of creatures in the learning task. The consequences of cholinesterase examine showed that 15 days medicines with oil ether 300 and 500 mg/kg separate of *M. koenigii* leaves surprisingly diminish the mind cholinesterase movement contrasted and those of their benchmark groups in matured mice. The norm, Doneprezil 0.5 mg/kg, diminished more cholinesterase movement.[22]

Antioxidative Property

Secluded carbazole alkaloids from dichloromethane concentrate of leaves of *M. koenigii* were assessed based on oil dependability record along with their revolutionary rummaging capacity against DPPH extremist based on slack opportunity to arrive at a consistent state. The 12 carbazoles were arranged into three gatherings. It recommended that an aryl hydroxyl substituent on the carbazole ring assumes a part in balancing out the warm oxidation and pace of response against DPPH revolutionaries. The antioxidative properties of the leaf concentrates of *M. koenigii* utilizing various solvents were assessed dependent on the oil dependability list OSI along with their revolutionary rummaging capacity against 1, 1-diphenyl-2-picrylhydrazyl 19. Mahanimbine and koenigine, two carbazole alkaloids, disengaged from the leaves of *M. koenigii* showed cancer prevention agent action. Koenigine additionally showed a serious level of radical scavenging properties.[41]

Cytotoxic Activity

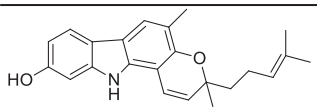
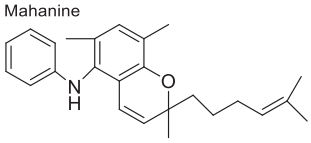
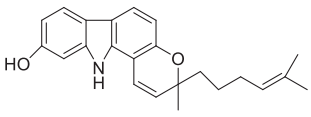
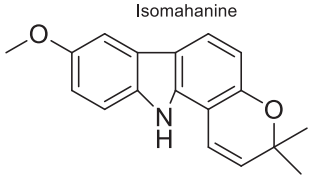
The secluded carbazole alkaloid as Koenoline from the root bark of *M. koenigii* displayed the cytotoxic action against KB cell culture framework. Carbazole alkaloids secluded from the stems of *M. koenigii* have consequences for the development of the human leukemia cell line HL-60. In addition, the carbazole alkaloids, mahanine, Pyrafoline-D, and murrafoline-I showed huge cytotoxicity against HL-60 cells and actuated the deficiency of mitochondrial layer potential.[42]

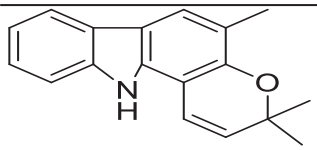
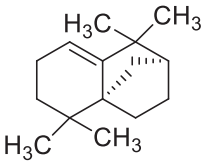
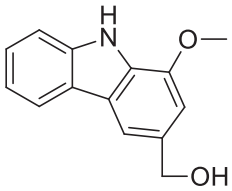
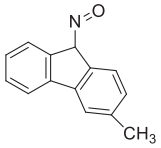
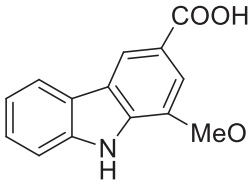
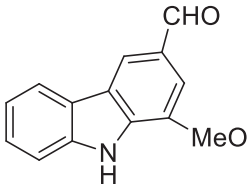
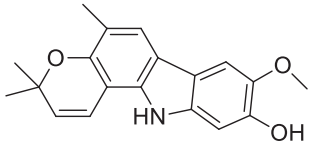
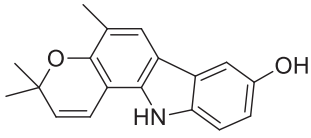
Memory Enhancing Activity

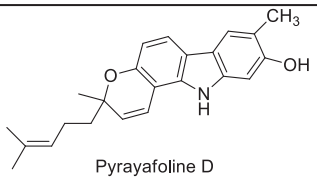
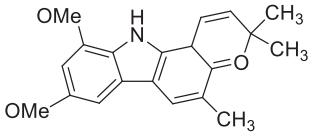
It was seen that ethanolic concentrate of leaves brought down serum cholesterol in mice, repressed mind acetylcholinesterase chemical and accordingly raised the acetylcholine focus in mind homogenate and at last further developed memory in matured mice. Extricate was utilized in two distinct focuses, viz. 300 mg/ml and 400 mg/ml. Consequently, a mix of anticholinesterase and cholesterol bringing down impact displayed by leaves concentrate might be the factors liable for this memory further developing impact saw in the concentrate on.[22]

Conclusion

The present review shows the investigated study on the pharmacological activities, phytoconstituents, and uses of

S. No.	*Chemical structure*	*Plant part used*	*Pharmacological activities*[43]
1.	 Mahanine	Leaves, stem bark, and seeds	Cytotoxicity, anti-microbial, and anti-Cancer
2.	 Mahanimbine	Leaves, roots, seeds, and fruits	anti-oxidant, anti-microbial.
3.	 Isomahanine	Leaves,	anti-oxidant, anti-diabetic, and hyperlipidemic
4.	 koenimbine	Leaves and roots	Cytotoxicity and anti-diarrhea.

S. No.	*Chemical structure*	*Plant part used*	*Pharmacological activities*[43]
5.	 Girinimbine	Leaves	Anti-tumor
6.	 Isolongifolene	Leaves	Neuroprotective
7.	 Koenoline	Leaves, seeds, and fruits	Cytotoxicity
8.	 9-formyl-3-methyl carbazole	Roots and stems	Anti-oxidant
9.	 Mukoeic acid	Stems	Anti-oxidant
10.	 Murrayanine	Stems bark	Anti-oxidant
11.	 Koenigine	Leaves and stem bark	Neuroprotective
12.	 Koenine	Leaves	Anti-oxidant

S. No.	*Chemical structure*	*Plant part used*	*Pharmacological activities*[43]
13.	 Pyrayafoline D	Leaves and stem bark	Anti-oxidant
14.	 Mukonicine	Stems	Cytotoxicity, anti-microbial, and anti-

the plant *M. koenigii*. *M. koenigii* is herbal plant that belongs to the family Rutaceae. It is commonly known as curry leaves. There is a large range of the plant *M. koenigii* and mostly found in tropical and subtropical regions in the world. The leaves of plants are used in treating piles, inflammation, itching, fresh cuts, dysentery, bruises, and edema. The roots of the plants are purgatives. They are used to stimulate the body and body aches. The bark is used in treating snakebites. The essential oils are extracted from *M. koenigii* leaves that are used in anti-oxidative, hepatoprotective, antimicrobial, antifungal, anti-inflammatory, and nephroprotective activities. The various medicinal properties of *M. koenigii* are depended on their chemical constituents like terpenoids, flavonoids, phenolics, carbohydrates, carotenoids, vitamins, and nicotinic acid from various parts of the *M. koenigii* plant. Many important factors are related to natural compounds that have no side effects which may have a benefits on medical treatments nowadays, which leads for many uneasy problems for the patient. India is a biodiversity hot spot and also has varieties of plant species which may have various medicinal properties in this allignment.

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