International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 6 Nov - Dec 2024, pp: 1269-1274 www.ijprajournal.com ISSN: 2456-4494

A review on Murraya koenigii (Curry leaves): Versatile multi-potential medicinal plant

Anupama Kumari[1], Pallavi kasaudhan[2], Archana[3]
[1]*Department of Pharmaceutics,Saroj Institute of Technology and Management,Ahimamau,Lucknow,226002,India.*
[2]*Department of Pharmaceutics,Saroj Institute of Technology and Management,Ahimamau,Lucknow,226002,India.*
[3]*Assistant Professor,Department of Pharmaceutics, Saroj Institute of Technology and Management, Ahimamau Lucknow,226002,India.*

Date of Submission: 15-12-2024 Date of Acceptance: 25-12-2024

ABSTRACT: "Medicine is food and food is medicine" is the best way to describe on how the ailments were cured by using the plants during the ancient period of time. Murraya koenigii (curry leaves) the "Magical plant of Indian Spice" is not only an inevitable part of spicing up dishes but also are rich in medicinal, neutraceutical properties and even cosmetic uses. It is found to be native to South Asia particularly India, Sri Lanka and Bangladesh. In India it is found almost everywhere in the Indian subcontinent excluding the higher levels of Himalayas. Curry leaves is found to be effective as antioxidant, antidiabetic, antimicrobial, anti-inflammatory, anti-carcinogenic, hepatoprotective, anti-hypercholesterolemic, antihypertensive, febrifuge and blood purifier, cytotoxic and also in the treatment of bronchial respiratory difficulties. The leaves are also been used externally to treat burns, bruises and skin eruption. It is also been used in preventing premature graying of hair. The whole plant is considered to be a tonic and stomachic. Apart from these medicinal properties the curry leaves are also been used from centuries as a species as natural flavouring agent. The extracted oil from the leaves is used in soap industry. The most important scientific studies on Murraya koenigii biological activity that are currently available are summarized in this article.

KEYWORDS: Murraya koenigii, phytochemistry, medicinal plant, phytochemistry, biological activity, research work.

I. INTRODUCTION

Murraya Koenigii, belongs to the family Rutaceae, commonly known as curry-leaf tree. It shares aromatic nature, more or less deciduous shrub or tree up to 6 m in height and 15-40 cm in diameter with short trunk, thin smooth grey or brown bark and dense shady crown.[1]

M. koenigii leaves are slightly bitter in taste, pungent in smell, and weakly acidic. They are used as antihelminthics, analgesics, digestives, and appetizers in Indian cookery. The green leaves of M. koenigii are used in treating piles, inflammation, itching, fresh cuts, dysentery, bruises, and edema. The roots are purgative to some extent. They are stimulating and used for common body aches. The bark is helpful in treating snakebites. The essential oil extracted from M. koenigii leaves is reported to possess anti-oxidative, hepatoprotective, antimicrobial, antifungal , anti-inflammatory, and nephroprotective activities in animal models.[2]

Figure1:Murraya koenigii plant

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 6 Nov - Dec 2024, pp: 1269-1274 www.ijprajournal.com ISSN: 2456-4494

Phytochemistry

The phytoconstituents isolated so far from the leaves are alkaloids viz., mahanine, koenine, koenigine, koenidine, girinimbiol, girinimibine, koenimbine, O-methyl murrayamine A, Omethyl mahanine, isomahanine, bismahanine, bispyrayafoline and other phytoconstituents such as coumarin glycoside viz., scopotin, murrayanine, calcium, phosphorus, iron, thiamine, riboflavin, niacin, vitamin C, carotene and oxalic acid. The essential oil from leaves yielded di- alpha phellandrene, D-sabinene, D-_-pinene, dipentene, D-_-terpinol and caryophyllene.[3]

From alcohol extract of stem bark Saha et al. (1998) has isolated koenigine- quinone A and koenigine quinone B, structures were established as 7- methoxy3 methyl carbazole- 1,4- quinone and 6, 7-dimethoxy3-methyl carbazole-1, 4- quinone respectively (Saha et al.,1998) 9- carbethoxy-3-methyl carbazole and 9- formyl –3- methyl carbazole were identified form M. koenigii by (Chakraborty et al .,1997) me- 2- methoxy carbazole –3- carboxylate and 1- hydroxy –3-methyl carbazole were isolated form stem bark (Bhattacharya et al., 1994).[4]

The pulp of fruits generally contain 64.9% moisture, 9.76% total sugar, 9.58% reducing sugar, 0.17% non reducing sugar and negligible amount of tannin and acids. It also contains 13.35% of vitamin C. The pulp of fruits contain trace amount of minerals 1.97% phosphorus, 0.082% potassium, 0.811% calcium, 0.166% magnesium and 0.007% iron. It also contain markable amount of protein.[1]

BOTANICAL PROFILE OF MURRARA KOENIGII

Kingdom - Plantae
Sub-kingdom - Tracheobionta
Superdivision - Spermatophyta
Division - Magnoliophyta
Class - Magnoliospida
Subclass - Rosidae
Order - Sapindales
Family - Rutaceae
Genus - Murraya J. Koenig ex L
Species -Murraya koenigii L. Spreng.

Vernacular name/s of Murraya Koenigii Spreng in various
Languages
Indian languages

Botanical - Murraya koenigii
Synonyms - Bergia koenigii, Chalcas koenigii
Bengali - Barsunga
Gujarathi - Mitho Limdo
Hindi - Meetha neem, Kari patta, Kathnim, Bursunga
Kannada - Karibevu
Malayalam - Kariveppilei, Kareapela
Marathi - Karipat, Karhi patta, Karhinimb, Jhirang
Oriya - Bansago
Sanskrit - Girinimba, Suravi
Tamil - Karivempu, Karuveppilei, Karivepila
Telugu - Karepaku, Karuvepaku

Foreign languages

Burmese - Pindosine, Pyim daw thein
Danish - Karrry bald
Dutch - Kerriebladeren
English - Curry leaves
French - Feuilles de cari, Feuilles de cury, Caloupilé
(Réunion), Carripoulé (Ile Maurice)
German - Curryblätter
Hungarian - Curry levelek
Icelandic - Karrilauf
Indonesian - Daun kari
Italian - Fogli de Cari
Laotian - Khi be
Malay - Daun kai pla, Karupillam
Norwegian - Kariblader
Singhalese - karapincha
Spanish - Hoja
Swahili - Bizari, Mchuzi
Tagalog - Bignay
Thai - Bai karee

Figure2: Murraya koenigii flowers

Figure 3: Murraya koenigii seeds

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 6 Nov - Dec 2024, pp: 1269-1274 www.ijprajournal.com ISSN: 2456-4494

MEDICINAL AND CURATIVE PROPERTIES

Anti-oxidative Activity

M. koenigii leaf extracts contain various carbazole alkaloids viz., mahanimbine and koenigine which shows radical-scavenging properties against 1-1-diphenyl-2-picrylhydrazyl i.e., DPPH radical and the oil stability index (OSI).[5]

In a study the coarse powder of leaves of Murraya koenigii (25 g) was subjected to successive extraction with different solvents in their increasing order of polarity from petroleum ether (600 -800C), chloroform, acetone, alcohol and water. Preliminary phytochemical screening of different extracts showed the presence of alkaloids, tannins, phenol, saponin, flavonoids, steroids, coumarins and sugars. Acetone, alcohol and aqueous extracts were chosen as it contains flavonoids and phenols which are generally potent inhibitors of free radicals.[6]

In another study the antioxidant properties and flavonoid content in M. koenigii leaves extracted using different extraction procedures namely, solvent assisted extraction SAE), microwave assisted extraction (MAE) and ultrasonic assisted extraction (UAE). M. koenigii leaves extracted using UAE exhibited better antioxidant activity than that of MAE and SAE. M. koenigii leaves extracted by MAE exhibited the highest total number of individual flavonoids compared to M. koenigii leaves extracted using UAE and SAE had the highest concentration of p-coumaric acid, myricetin and quercetin concentration (mg/L). Catechin was the highest flavonoid detected in all the different extraction methods used in the study.[7]

Anti-cancer Activity

Carbazole, girinimbine extracted from Murraya koenigii bark induces extensively programmed cell death in cells of HepG2. The results obtained from the study which was conducted by Bhattacharya et al. in 2010 gave evidence that there was an involvement of death receptor arbitrated extrinsic pathway of apoptosis by mahanine. It produced anti-cancer activity in MOLT-3 cells but somehow did not produce in K562 cells. Furthermore, pyrayafoline, murrafoline and three carbazole alkaloids, mahanine exhibit major activity towards HL-60 cells. Mahanine as the major anti-cancerous bioactive molecule in M.koenigiihas also been supported by Samanta in their review.[8]

In a study done to evaluate the effect of column (SU I, SU II, SU III) extracts of the plant Murraya koenigi against in vitro (short term incubation method, SU I, SU II, SU III) and in vivo (Dalton's Ascitic Lymphoma, SU II) has been evaluated in male swiss albino mice. Intraperitoneal inoculation of DAL cells in the mice produced an enormous increase in the cancer cell count which indicated that there is progression of cancer in the animals. Two days after cells injection the animals were treated with 7 mg/Kg of SU II for 15 days. 5-flurouracil (20 mg/Kg) was used as the reference. On day 16, cancer cell number compared with the same parameter in control. A significant decrease in the cancer cell number and tumour weight were noted in the tumour-induced mice after treatment with SU II. These observations are suggestive of the protective effect of extract in Dalton's Ascitic Lymphoma (DAL). In vitro studies all the column extracts showed moderate activity.[9]

The decrease in the cancer cell number observed in the ether extract of Murraya koenigii the treated mice of G4 indicates that the test drug is having significant inhibitory effect on the tumour cell proliferation. The increase in tumour weight of G2 may be due to accumulation of peritoneal fluid as an abnormal enlargement of peritoneal cavity was observed in tumour-induced mice. Treatment with extract of Murraya koenigii reduced the tumour weight and hence increased the life span. These observations on the effect of extract of Murraya koenigii on parameters studied to evaluate the antitumour activity enabled to conclude that it has significant antitumour activity.[9]

Anti-inflammatory Activity

The petroleum Ether, chloroform and ethanol extracts were prepared by using soxhlet extraction method. The petroleum ether, chloroform and ethanol extracts of Murraya koenigii were screened at dose of (250mg/kg) for anti inflammatory activity by using acute carrageen induced paw oedema method and yeast induces hyperpyrexia method respectively. The ethanolic extract shows significant effects in anti-inflammatory activity. It was observed that Petroleum ether and chloroform extract did not show significant decrease in paw edema volume with respect to corresponding control. The Ethanolic extract gives significantly reduced paw edema volume.Hence it can be concluded that ethanolic extract of Murraya koenigii possess anti inflammatory activity that may be mediated by alkaloids, flavonoids and triterpenoids.[10]

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 6 Nov - Dec 2024, pp: 1269-1274 www.ijprajournal.com ISSN: 2456-4494

In anther study done for the investigation of the anti-inflammatory activity of solvent extracts of dried leaves of Murraya koenigii Linn. by oral administration at dose of 100, 200 and 400 mg/kg body weight in healthy albino rats. Extracts were studied for its anti-inflammatory activity by using carrageenan- induced hind paw edema in albino rats and the mean increase in paw volume and % inhibition in paw volume were measured plethysmometrically at different time intervals after carrageenan (1% w/v) injection.

There was a gradual increase in oedema paw volume of rats in the control group. However, in the test groups, methanol and aqueous extracts (400 mg/kg) showed a significant reduction in the oedema paw volume. There was no reduction in inflammation found in case of rats treated with petroleum ether and hexane extracts. Methanol extracts were found to possess maximum antiinflammatory activity in comparison to aqueous extracts in dose dependent manner. The inhibitory effect was thus highest with 400 mg/kg. The present study provides evidence that the methanol and aqueous extracts of Murraya koenigii acts as an antiinflammatory agent in rats in acute inflammation model.[11]

Antidiabetic activity

According to the experiment on rats, aqueous and methanolic extract of Murraya koenigii leaves reduced the plasma glucose levels in the alloxan induced rats. The ethanolic extract of stem of Murraya koenigii reported a remarkable reduction in the blood glucose level, triglyceride, total cholesterol level and body weight.[8]

In the study Diabetes was induced in adult male Wistar rats by intra-peritoneal injection of streptozotocin (45mg/kg). Mahanimbine (50 and 100mg/kg) were administrated as a single dose per week to the diabetic rats for 30 days. The control group received 0.3% w/v sodium carboxy methyl cellulose for the same duration. Fasting blood sugar and serum lipid profiles were measured in the diabetic and non-diabetic rats. In addition, in vitro alpha amylase and alpha glucosidase inhibitory effects of mahanimbine were performed.

In the diabetic rats, the elevated fasting blood sugar, triglycerides, low density lipoprotein, very low density lipoprotein levels were reduced and high density lipoprotein level was increased by mahanimbine at a dose of 50 and 100mg/kg (i.p). In addition, mahanimbine showed appreciable alpha amylase inhibitory effect and weak alpha glucosidase inhibitory effects when compared with acarbose. Murraya koenigii lowers the HFFD induced hyperlipidemia in rats. [12]

Antimicrobial activity

The roots of Murraya Koenigii possess antimicrobial activity. The hexane, methanol and chloroform extract of the roots show antibacterial and antifungal activity. These extracts were tested among various types of bacterial species such as Bacillus Subtilis, Staphylococcus aureus, Escherichia coli and Salmonella typhi. These extracts are also being tested on various fungal species such as Aspergillus niger, Candida albicans and Trichophyton rubrum. Among all the extracts the methanolic extract shows more significant antibacterial activity wereas the aqueous extract is ineffective on all the species. Among all the selected species of microbes the Staphylococcus aureus is more susceptible to all the above extracts.[13]

In another study it was found that the essential oils from Murraya koenigii leaves showed an anti-bacterial effect against Corynebacterium pyogenes, Streptococcus aureus, Bacillus subtilis, Pasteurella multocida and Proteus vulgaris. The oil was found active against the bacteria even at a dilution of 1:500.[8]

Skin pigmenting

The formulation of cream of essential oil of leaf of M. koenigii was found to have sun protection factor. It was postulated that cream parameters complied as per official acceptance criteria's but the SPF sun pigmenting factor for curry leaf oil cream formulation showed minimum sun protection activity for sunlight and erythema. The cream was found useful in maintaining the natural skin pigmentation or it can be used as additives in other formulations to enhance the activity.[1]

Hepatoprotective activity

Gupta et.al has studied the hepatoprotective nature of M. koenigii leaves extract. The effect was due to the combined effect of carbazole alkaloids such as Girinimbine, Mahanine, Mahanimbine, Isomahanimbine, Murrayazolidine, Murrayazoline and minerals such as Zinc, Iron, Copper along with α-tocopherol and ascorbic acid, extracted from the leaves. Thus M. koenigii is a favorable and a rich source of free radical quencher. The process is mediated through hepatocyte membrane stabilizing activity along with the reduction of fat metabolism. Hydroethanolic leaf extracts of Murraya koenigiii

International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 6 Nov - Dec 2024, pp: 1269-1274 www.ijprajournal.com ISSN: 2456-4494

in doses of 200, 400 and 600mg/kg body weight demonstrates a pronounced decrease in the levels of alanine aminotransferases, aspartate aminotransferases, alkaline phosphatases and total bilirubin in CCl4 treated hepatotoxic rats. Also there is a dose-dependent. elevation in hepatic superoxide dismutase, ascorbic acid, catalase, reduced glutathione and a decline in lipid peroxidation. Microscopic studies report minimal CCl4 induced lesions in Murraya koenigii treated rats, suggesting the hepatoprotective potential of curry leaf. The carbazole alkaloids and tannins from the aqueous extracts exhibits wonderful hepatoprotective activity against ethanol-induced hepatotoxicity comparable to the standard drug L-ornithine L- aspartate (LOLA). The acetone extract of powdered dry bark shows protection of liver cells in comparison to the control group of rats and other solvents in CCl4-induced liver damage.[14]

II. CONCLUSION

The goal of the current review is to evaluate the considerable interest in Murraya plant research while highlighting recent accomplishments, particularly in the fields of phytomedicines, traditional medicine, and other rapidly developing fields worldwide. The data that we have provided here unquestionably demonstrates the enormous potential of organic solvent extracts in treating and/or alleviating a variety of human issues. The antidiabetic effect of the leaf extracts is one of the most important discoveries. Perhaps connected to this antihyperlipidemic action is the regular consumption of leaf decoctions by tribal people for overall health. Lastly, we noted that Murraya Koenigii , like a great deal of other unknown forest plants, has great potential as a vast reservoir of magical compounds that would undoubtedly help humanity in the decades to come. Accordingly, it may be said that M. Koenigii is an herbal medicine that Indian tribes and traditional vaidya already utilize, however, more research and validity are required.

FUTURE PROSPECT

Murraya koenigii can be utilized to make a variety of goods, including food, medicine, drinks, and other items that not only encourage value addition but also fruit sales in study areas and local weekly markets. It will assist in creating small scale industries that will improve rural communities' ability to make ends meet financially. Because the majority of the process is done manually, which takes time, correct machinery setup is necessary for installing in order to increase the economic value. By using plant species sustainably, one can aid in conservation efforts provided appropriate legislation prohibiting the harvesting process.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper.

REFERENCES

[1]. Handral H.K. , Pandith A. ,Shruthi S.D. 2012, " A review on Murraya Koenigii : Multipotential medicinal plant" Asian Journal of Pharmaceutical and Clinical Research, Vol-5,September 2012.

[2]. Balakrishnan R., Vijayraja D., Jo S.H., Ganesan P., Kim I.N., Choi D.K., "Medicinal Profile, Phytochemistry,and Pharmacological Activities of Murraya koenigii and its Primary Bioactive Compounds" MDPI , 2020.

[3]. Saini S.C., Reddy G.B.S., "A Review on Curry Leaves (Murraya koenigii): Versatile Multi-potential Medicinal Plant"American Journal of Phytomedicine and Clinical Therapeutics.

[4]. Reddy B.M., Dhanpal C.K., Lakshmi B.V.S., "A review on Curry leaves (Murraya koenigii):versatile multi-potential medicinal plant" 2018.

[5]. Goyal P., Chhabra R., Vij L., "Current Journal of Applied Science and Technology"June 2020.

[6]. Gupta S., Paarakh P.M., Gavani U., "Antioxident Activity f Murraya Koenigii Linn Leaves" 2019 Page no: 475-476.

[7]. Parithy M.T., Mohd Zin Z., Hasmadi M., Rusli N.D., Smedley K.L., Zainol M.K., "Antioxidants Properties of Murraya koenigii: a comparative study of three different extraction methods "FOOD RESEARCH Page no.44-49 Feb 2021.

[8]. Goel A., Sharma A. and Kulshrestha S., "A phytopharmacological Review on Murraya koenigii: An Important Medicinal Plant" International Journal of Pharmaceutical Sciences Review and Research, Page no: 114,115,116. May 2020.

[9]. Muthumani P., Venkatraman S., Ramseshu K.V., Meera R., Devi P., Kameswari B. and Eswarapriya B., "Pharmacolgical studies of anticancer, anti inflammatory activities of

Murraya koenigii Spreng in experimental animals" Journal of Pharmaceutical Sciences and Research, Vol 3, 2009, Page no:137-139.

[10]. Darvekar V.M., Patil V.R. and Choudhari A.B., "Anti-inflammatory activity of Murraya Koenigii Spreng on experimental animals" Scholars Research Library Page no: 65-68, 2011 .

[11]. Prasad and Dua V.K., "Anti-inflammatory activity of leaves extracts of Murraya Koenigii" International Journal of Pharma and Bi Sciences, Vol 2, Mar 2011, Page no:541-543.

[12]. Kumar B.D., Mitra A., Mahadevappa M., "Antidiabetic and hypolipidemic effects of mahanimbime (carbazole alkaloid) from Murraya koenigii leaves" Interantional Journal of Phytomedicine, 2010, Page no:22.

[13]. Chauhan B., Dedania J., Mashru R.C., "Review on Murraya koenigii: Versatile role in management of human health" World Journal of pharmacy and Pharmaceutical sciences" Vol 6 ,2017, Page no:484,485.

[14]. Shaikh H., Shaikh S., Rao P., "A review on Indian traditional herb Murraya koenigii its nutritive and medicinal properties in human health management"World journal of pharmaceutical research"Vol 9, Page no:859.