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REVIEW ON "CURRY LEAF" MURRAYA KOENIGII

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ABSTRACT
The discovery of several revitalizing molecules that can stop or reduce the pathology of a wide range of diseases will be considered a major breakthrough of the present time. Available synthetic compounds may provoke side effects and health issues, which heightens the need for molecules from plants and other natural resources under discovery as potential methods of replacing synthetic compounds. In traditional medicinal therapies, several plant extracts and phytochemicals have been reported to impart remedial effects as better alternatives. Murraya koenigii (M. koenigii) belongs to the Rutaceae family, which is commonly used as a medicinally important herb of Indian origin in the Ayurvedic system of medicine. Previous reports have demonstrated that the leaves, roots, and bark of this plant are rich sources of carbazole alkaloids, which produce potent biological activities and pharmacological effects. These include antioxidant, antidiabetic, anti- inflammatory, antitumor, and neuroprotective activities. The present review provides insight into the major components of M. koenigii and their pharmacological activities against different pathological conditions. The review also emphasizes the need for more research on the molecular basis of such activity in various cellular and animal models to validate the efficacy of M. koenigii and its derivatives as potent therapeutic agents.

INTRODUCTION

The use of plant-based natural products in the treatment and prevention of diseases and health enhancement due to nutritive importance and pharmacological benefits has led to the significant attention of the scientific community and the general public nowadays. Medicinal plants are readily available and provide a cost-effective source with lesser side effects to develop new drugs.[1,2]

Plant-based traditional medicine is the stronghold of societies of many Asian countries in dealing with health and has a long history since ancient civilization, which uses plant materials as a significant ingredient in synthesizing drugs in different forms such as decoctions. It is a widely accepted fact that the rapid development of deriving pharmacologically active drugs from medicinal herbs has a tremendous impact on current medicinal practices.[3]

For instance, in cancer treatment, more than 60% of all pharmaceuticals on the current market are natural products or mimics of natural products.[4]

Furthermore, research has showed that plant-based diets rich with medicinal herbs are low-risk interventions that lower body mass index (BMI), blood pressure, glycated hemoglobin (HbA1C), and cholesterol levels. Therapeutic herbs may also reduce the number of medications needed to treat many metabolic and noncommunicable diseases, including diabetes, cancers, cardiovascular diseases, obesity, and the majority of metabolic and noncommunicable diseases are linked with higher mortality and morbidity rates.[5]

Synonyms

Curry Leaf (English), Karepaku (Andhra Pradesh), Narasingha (Assam) Barsanga, Kartaphulli (Bengal); Gorenimb (Gujrat) Mitha Neem (Himachal Pradesh); Kathnim, Mitha Neem, Kurry Patta (Hindi); Karibeva (Karnataka) Kariveppilei (Kerala) Gandhela, Gandla, Gani (Kumaon); Bhursanga (Orissa) Mahanimb (Sanskrit); Karivempu (Tamilnadu).

Biological source

Leaves of the curry tree, Murraya koenigii or Bergera koenigii, *is a tropical to sub-tropical tree.*

Family: Rutaceae
Taxonomic status
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 spreng.

Geographical: Source

Murraya koenigii originates from east and south part of India, Pakistan, Sri Lanka, China and Hainan but widely cultivated in South-East Asia and some parts of the United States and Australia.13 It grows throughout India up to the height of 1500 to 1655m from sea level and in the Andaman Islands.14 It is also available in other part of Asian region like in moist forests of 500-1600m15 height in Guangdong, Shainan, S Yunnan (Xishuangbanna), Bhutan, Laos, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam.

Chemical Constituents

Murraya koenigii is very rich source of organic compounds with different chemical composition such as alkaloids, flavonoids carbohydrates, and sterol is present in the plant extract prepared in solvents such as petroleum ether, ethyl acetate, chloroform, ethanol and water.

Molecular Mechanism and Activities of M. koenigii
Antioxidants

Reactive oxygen species (ROS), such as singlet oxygen (O2), hydrogen peroxide (H2O2), the superoxide anion (O2•−), and the hydroxyl radical (OH), are often generated as byproducts of cellular metabolic reactions and exogenous induction. These ROS create homeostatic imbalances, which lead to the generation of oxidative stress, which in turn, induces cell death and tissue injury.[6]

ROS in elevated levels can damage biomolecules such as nucleic acids, proteins, and lipids.[7]

Oxidative Stress

Chemical species with one or more unpaired electrons are called free radicals. In biological systems, the term "free radicals" refers to reactive oxygen species (ROS). Major ROS include O2•−, H2O2, and •OH.[8]

Beneficial Pharmacological Activities of M. koenigii.

Antifungal Activity

The antifungal activity of M. koenigii has been reported in various studies. For example, the essential oil of the leaves was reported to possess antifungal activity.[9]

The antifungal activity of the leaves of M. koenigii is due to the presence of phytochemical constituents of complex molecular structures and diverse action mechanisms, viz. alkaloids, terpenoids, flavonoids, phenolics, tannins, and saponins, which are known for their antimicrobial properties. Different investigations support the traditional use of the plant as an antifungal agent. In vitro antifungal activity may explain the use of curry leaves for the treatment of diarrhea, dysentery, and skin eruptions in folklore medicines.[10]

Antibacterial Activity

The unsystematic use of antibiotics promotes the development of multiple drug-resistant pathogenic strains of bacteria, which are very harmful, and there is a lack of proper treatment procedures for these ailments. Therefore, the need to search for new antimicrobials remains. Currently, in addition to antibiotics and chemically-synthesized drugs, curiosity for alternative medicines, such as natural or herbal medicines, is increasing. They may have fewer side effects or toxicity owing to their natural sources.[11]

Hepatoprotective Effect

Liver diseases are a worldwide concern, and accessible medical treatments have an inadequate efficacy. Since ancient times, herbs have been used when treating various disease conditions; plant extracts and natural compounds have significant applications as hepatoprotective agents. The liver is the site of drug metabolism and the detoxification site of toxic products, and so it is the organ most exposed to xenobiotics.[12]

Antidiabetic Activity

A study reported that an ethanolic extract of M. koenigii showed a significant reduction in blood glucose levels, and this effect of reducing blood glucose by M. koenigii is mediated by antioxidant properties and insulin mimetic effects. In addition, M. koenigii exhibited a profound antioxidant effect by reducing the malondialdehyde (MDA) level, increasing the GSH level, and significantly decreasing the homeostatic model assessment (HOMA)-insulin resistance index. On the whole, it is evident that M. koenigii possesses antidiabetic activity and has antioxidant effects in rats.[13]

Immunomodulatory Activity

The immune system makes a network and regulates processes important for maintaining the health of an organism by hindering the entry and invasion of microbes. Impairments in the immune system lead to conditions from chronic inflammation to cancer.[14]

Nephroprotective Activity

The nephroprotective activity of M. koenigii was elucidated in experimental investigations, which showed decreased levels of blood urea nitrogen (BUN), serum creatinine (Cr), and lipid peroxidation (LPO). An M. koenigii extract is efficient against cyclophosphamide-induced nephrotoxicity, which was clearly revealed

through the maintenance of high levels of glutathione (GSH) and superoxide dismutase (SOD) compared to the cyclophosphamide-treated group.[15]

REFERENCES

1. Atanasov A. G., Waltenberger B., Pferschy-Wenzig E.-M., et al. Discovery and resupply of pharmacologically active plant-derived natural products: a review. Biotechnology Advances, 2015; 33(8): 1582–1614. doi: 10.1016/j.biotechadv. 2015.08.001. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
2. Yuan H., Ma Q., Ye L., Piao G. The traditional medicine and modern medicine from natural products. Molecules, 2016; 21(5). 559. doi: 10.3390/molecules21050559. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
3. Thomford N., Senthebane D., Rowe A., et al. Natural products for drug discovery in the 21st century: innovations for novel drug discovery. International Journal of Molecular Sciences, 2018; 19(6): 1578. doi: 10.3390/ijms19061578. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
4. Newman D. J., Cragg G. M. Natural products as sources of new drugs over the nearly four decades from 01/1981 to 09/2019. Journal of Natural Products, 2020; 83(3): 770–803. doi: 10.1021/acs. jnatprod.9b01285. [PubMed] [CrossRef] [Google Scholar]
5. Hu J., Wang J., Gan Q.-X., et al. Impact of red yeast rice on metabolic diseases: a review of possible mechanisms of action. Journal of Agricultural and Food Chemistry, 2020; 68(39): 10441– 10455. doi: 10.1021/acs.jafc.0c01893. [PubMed] [CrossRef] [Google Scholar]
6. Sathaye S, Bagul Y, Gupta S, et al. Experimental and toxicologic pathology: official journal of the gesellschaft fur toxikologische pathologie. Experimental and Toxicologic Pathology, 2011; 63(6): 587–591.
7. Brand M.D., Affourtit C., Esteves T.C., Green K., Lambert A.J., Miwa S., Pakay J.L., Parker N. Mitochondrial superoxide: Production, biological effects, and activation of uncoupling proteins. Free Radic. Biol. Med, 2004; 37: 755–767. doi: 10.1016/j.freeradbiomed.2004.05.034. [PubMed] [CrossRef] [Google Scholar]
8. Thannickal V.J., Fanburg B.L. Reactive oxygen species in cell signaling. Am. J. Physiol. Lung Cell. Mol. Physiol, 2000; 279: L1005–L1028. doi: 10.1152/ajplung.2000.279.6.L1005. [PubMed] [CrossRef] [Google Scholar]
9. Dexter D.T., Wells F.R., Lee A.J., Agid F., Agid Y., Jenner P., Marsden C.D. Increased Nigral Iron Content and Alterations in Other Metal Ions Occurring in Brain in Parkinson's Disease. J. Neurochem, 1989; 52: 1830–1836. doi: 10.1111/j. 1471-4159.1989.tb07264.x. [PubMed] [CrossRef] [Google Scholar]
10. Goutam M.P., Purohit R.M. Antimicrobial activity of the essential oil of the leaves of Murraya koenigii (Linn) Spreng (Indian curry leaf) Indian J. Pharm, 1974; 2: 48–51. [Google Scholar]
11. Maswada H.F., Abdallah S.A. In vitro antifungal activity of three geophytic plant extracts against three post-harvest pathogenic fungi. Pakistan J. Biol. Sci., 2013; 16: 1698–1705. doi: 10.3923/pjbs.2013. 1698.1705. [PubMed] [CrossRef] [Google Scholar]
12. Deb S. Synthesis of silver nano particles using Murraya koenigii (Green Curry leaves), Zea mays (Baby corn) and its antimicrobial activity against pathogens. Int. J. PharmTech Res., 2014; 6: 91–96. [Google Scholar]
13. Manfo F.P.T., Nantia E.A., Kuete V. Toxicological Survey of African Medicinal Plants. Elsevier; Yaoundé, Cameroon. Hepatotoxicity and Hepatoprotective Effects of African Medicinal Plants, 2014; 223–256. [Google Scholar]
14. Husna F., Suyatna F.D., Arozal W., Poerwaningsih E.H. Anti- Diabetic Potential of Murraya koenigii (L) and its Antioxidant Capacity in Nicotinamide-Streptozotocin Induced Diabetic Rats. Drug Res. (Stuttg), 2018; 68: 631–636. doi: 10.1055/a-0620-8210. [PubMed] [CrossRef] [Google Scholar]
15. Kaufmann T., Simon H.U. Targeting disease by immunomodulation. Cell Death Differ, 2015; 22: 185–186. doi: 10.1038/cdd.2014.166. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
16. Mahipal P., Pawar R.S. Nephroprotective effect of Murraya koenigii on cyclophosphamide induced nephrotoxicity in rats. Asian Pac. J. Trop. Med, 2017; 10: 808–812. Doi:10.1016/j.apjtm.2017. 08.005. [PubMed] [CrossRef] [Google Scholar]