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Phytochemical Screening and Antimicrobial Activity of Leaves of Murraya Koenigii (Rutaceae)

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Abstract

Murraya koenigii (curry leaf), a member of the Rutaceae family, is widely used in traditional medicine due to its rich phytochemical composition and therapeutic properties. This review summarizes existing research on the phytochemical constituents and antimicrobial potential of M. koenigii leaves. Various studies have identified alkaloids, flavonoids, terpenoids, and phenolic compounds in its extracts, which contribute to its antibacterial, antifungal, and antioxidant effects. The antimicrobial activity of M. koenigii has been tested against pathogens such as Staphylococcus aureus, Escherichia coli, and Candida albicans, demonstrating significant inhibitory effects. This paper consolidates findings from multiple studies to highlight the plant's medicinal value and potential applications in pharmaceutical and food preservation industries.

Keywords: *Murraya koenigii*, Phytochemicals, Antimicrobial Activity, Curry Leaf, Rutaceae

1. Introduction

Murraya koenigii, commonly known as curry leaf, is an aromatic plant native to India and Southeast Asia. It is extensively used in culinary and Ayurvedic medicine for its digestive, anti-inflammatory, and antimicrobial properties (Palaniswamy et al., 2020). The leaves contain bioactive compounds such as carbazole alkaloids, flavonoids, and essential oils, which contribute to their pharmacological effects. Increasing antibiotic resistance has necessitated the search for natural antimicrobial agents, and *M. koenigii* presents a promising candidate. This review compiles existing literature on its phytochemical composition and antimicrobial efficacy.

2. Phytochemical Composition of Murraya koenigii

Phytochemical screening of M. koenigii leaves has revealed the presence of:

Alkaloids (e.g., mahanimbine, koenimbine) – contribute to antimicrobial and anti-inflammatory effects.

Flavonoids (e.g., quercetin, kaempferol) – exhibit antioxidant and antibacterial properties.

Terpenoids and Essential Oils (e.g., β-caryophyllene, α-pinene) – possess antifungal and antiviral activity.

Phenolic Compounds – enhance free radical scavenging and microbial inhibition (Ningappa et al., 2008).

3. Antimicrobial Activity of Murraya koenigii

Several studies have demonstrated the antimicrobial potential of M. koenigii leaf extracts:

Antibacterial Activity: Effective against Staphylococcus aureus, Escherichia coli, and Pseudomonas aeruginosa (Tiwari et al., 2014).

Antifungal Activity: Inhibits Candida albicans and Aspergillus niger (Balakrishnan et al., 2015).

Mechanism of Action: Disruption of microbial cell membranes and inhibition of enzyme activity.

4. Conclusion

The phytochemical richness of Murraya koenigii leaves contributes to their significant antimicrobial properties, making them a potential alternative to synthetic antibiotics. Further research is needed to isolate active compounds and develop standardized formulations for clinical use.

5. References

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3. Tiwari, P., et al., "Phytochemical Screening and Antibacterial Activity of Murraya koenigii," Asian Pacific Journal of Tropical Biomedicine, 2014, 4(2), 123–127.
4. Balakrishnan, R., et al., "Antifungal Properties of Murraya koenigii Essential Oil," Journal of Applied Microbiology, 2015, 119(5), 1324–1330.

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Table 1.Major Phytochemical Compounds Identified in Murraya koenigii Leaves

Phytochemical Class	Example Compounds	Biological Activity
Alkaloids	Mahanimbine, Koenimbine	Antimicrobial,Anti-inflammatory
Flavonoids	Quercetin, Kaempferol	Antioxidant, Antibacterial
Terpenoids	β-Caryophyllene, α-Pinene	Antifungal, Antiviral
Phenolic Compounds	Gallic Acid, Caffeic Acid	Free Radical Scavenging, Antimicrobial .

Table2 Antimicrobial Activity of Murraya koenigii Leaf Extracts Against Pathogenic Microorganisms.

Microorganism	Zone of Inhibition (mm)	Extract Used
Staphylococcus aureus	12–18	Methanolic Extract
Escherichia coli	10–15	Aqueous Extract
Candida albicans	8–12	Essential Oil

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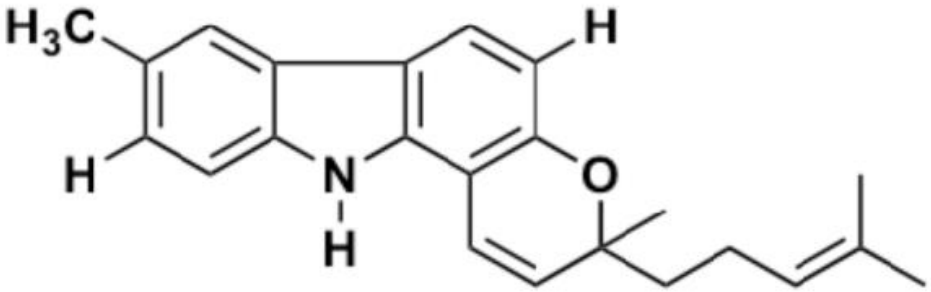
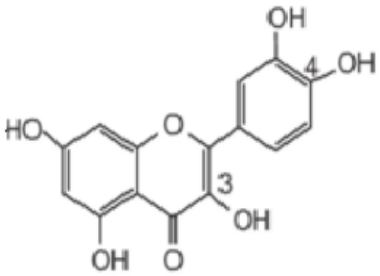
Figure 1: Chemical Structures of Key Bioactive Compounds in Murraya koenigii

1. Mahanimbine (Carbazole Alkaloid)



Structure of Mahanimbine

2. Quercetin (Flavonoid)



Quercetin

3.β-Caryophyllene (Sesquiterpene)

β-Caryophyllene