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Characterization and Antifungal Activity of *Murraya koenigii* (l.) Essential oil

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ABSTRACT

Murraya koenigii (L.) is an in-demand leaf-spice used in very small quantities for its definite odour due to the presence of volatile oil contents. Curry leaves are commonly used in culinary for flavoring food stuff. In current investigation, chemical constituents of curry leave essential oil (EO) were characterized and checked with its antifungal properties. There were three treatments, and each treatment was replicated thrice. In this experiment, Completely Randomized Design (CRD) was used. Each replication contained ten kg of curry leaves for the extraction of essential oil. Chemical compounds of curry leave essential oil were characterized by gas chromatography-flame ionization detection (GC-FIC). The antifungal action against *Aspergillus flavus* and *Aspergillus niger* was checked by using Disc Diffusion Method. It is concluded that the curry leaf essential oil is best treatment against diseases caused by *A. flavus* and *A. niger*

Keywords: *Murraya koenigii*, Gas Chromatography-Flame Ionization Detection (GC-FIC), *Aspergillus niger* and *Aspergillus flavus*

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Introduction

Curry leaf, scientifically known as *Murraya koenigii*, is a fragrant member of the Rutaceae family, containsS 1,600 species and a diverse array of 150 genera. These aromatic leaves, often called Kari patta (1). Curry leaves are commonly grown all over Asia. The plant is generally used in Indian traditional medicine for treating a variety of illnesses and also being used as spice, herb and condiment. The curry leaves are used widely for vomiting and diarrhea, as well as for stomachic and carminative effects. It was also used as a pile treatment, anthelminthic, analgesic and to relieve fever, thirst, inflammation, and itching (2). Curry leaves are fundamental to traditional Yunani and Ayurvedic cooking and rituals (3). In India curry leaves (*Murraya koenigii*) are used in culinary purposes for their unique fragrance to get the most health benefits, it is recommended to use them fresh (4). Among the many natural substances obtained from plants, aromatic herbs are the source of essential oil and are gaining popularity due to their radical-scavenging abilities (5). The leaves of curry patta often contain a high concentration of essential oils, with varying chemotypes based on the plant's geographic location and genetic heritage (6).

Plant leaves, roots, and bark contain carbazole alkaloids with antioxidants, antidiabetic, anti-inflammatory, antitumor, and neuroprotective properties (7). The phytochemical evaluation of ethanolic extract revealed a mix of various chemicals. These included sugars (carbohydrates), building blocks of proteins (amino acids), and some tannins and phenolics, which are known plant compounds. Interestingly, the extract did not contain any soapy substances (saponins) (2). Nature is full of plants with amazing properties. These plants contain a wide variety of natural chemicals that can have different effects on our health. Because of this, they are valuable resources for creating foods that benefit our well-being (functional foods) and for developing new medicines (8). Many fragrant plants and spices are considered very valuable in the medicine, food, and beauty industries because they have pleasant fragrance, fight free radicals, and kill germs (9). Curry leaves EOs have gained significant value beyond their traditional use in cosmetics. They are now important for their potential aromatherapy and pharmaceutical benefits. This has created global marketing opportunities. Our research shows that these oils are used in various products like soaps, lotions, massage oils, diffusers, and more. This study aimed to investigate if curry leaves essential oils could be a new source of natural antioxidants and phenolic compounds (10).

Hydro distillation has been used to extract essential oils for over 5000 years (11). According to the literature, hydro distillation is an often-used procedure to extract essential oil. It is less expensive to operate and maintain than other techniques (12). There are a few ways to perform hydro distillation. In all methods, the plant material is placed in a sealed container. Water is then either added and boiled, or steam is directly injected. This heating process creates a vapor that carries the essential oils from the plant (13). Twenty kg of curry leaves were used to get essential oil by using the technique of steam distillation and sample were distilled for 2 hrs. (14). The essential oil was extracted from 100 grams of shade-dried curry leaves using a Clevenger-type apparatus through hydro-distillation at a temperature of 100°C for 5-6 hours (15).

Plants are a treasure trove of natural resources that can fight serious diseases. In developing countries especially, traditional medicine, particularly using medicinal plants, remains a crucial source of basic healthcare. These plants' medicinal properties come from bioactive compounds that have specific effects on the human body. Common examples include alkaloids, tannins, flavonoids, and phenolics. These compounds are responsible for the plant's various pharmacological benefits, such as reducing inflammation, managing diabetes and cholesterol, treating ulcers, protecting against cell damage, fighting microbes, and easing diarrhea. One such plant rich in these bioactive compounds is *Murraya koenigii*, the focus of this review paper which explores its botanical background, chemical makeup, and medicinal properties (16).

Plants produce a variety of chemical compounds beyond those essential for their basic functions. These "secondary metabolites" serve as a defense mechanism, protecting the plant from threats. Essential oils are a prime example of such secondary metabolites. They're a complex blend of numerous compounds from various chemical classes, including hydrocarbons, phenols, terpenes, alcohols, aldehydes, ketones, esters, ethers, and more (17).

Essential oils are concentrated liquids extracted from aromatic plants, used for a variety of purposes across different industries. The extraction process itself can vary, with each method affecting the final product's properties. These potent oils are a treasure trove of chemical compounds - over 200 to be exact! And this complex mix, containing both volatile and non-volatile components, holds the key to their potential benefits (18). The delightful scent and taste of curry leaf are a symphony of compounds, including pinene, sabinene, caryophyllene, cadinol, and cadinene. However, the taste is a complex melody, and leaves offer a hint of pungency and bitterness, they also have a subtle tang of acidity (19). Essential oils (EOs) are the volatile organic essence of plants. These valuable liquids contain a wide range of therapeutic properties and are responsible for a plant's unique fragrance. (20).

The chemical secrets of essential oils can be unraveled through a powerful tool Gas Chromatography-Mass Spectrometry (GC-MS). This technique is used by scientists to dissect the complex mixture of compounds found in curry leaves (*M. koenigii*) and *M. paniculata* leaves. By separating the oil into its individual components and analyzing it with a specialized gas chromatograph connected to a mass spectrometer and researchers can identify their precise composition (21). The antifungal powers of curry leaf essential oil (MKLEO) were put to the test against a group of ten notorious fungal villains and this rogue's gallery are well-known culprits such as *A. flavus*, notorious for food spoilage, and *F. oxysporum*, a plant pathogen. Moreover, the researchers employed a standard technique called the Blotter Method to track down these fungal foes. This involved isolating the fungi from infected young trees and spoiled food to reveal their hiding places (22). The *M. koenigii* essential oil to test against a range of bacterial foes for both gram-positive and gram-negative types. Gram positive and gram-

negative. *C. pseudotuberculosis, S. pyogenes, K. pneumonia, P. aeruginosa, E. aerogenes, V. cholera, E. coli, S. enterica, P. mirabilis, and S. aureus* (10).

Conclusion

Gas Chromatography- Flame Ionization Detection (GC-FID) is an effective tool to identify the unique composition of *Murraya koenigii* essential oil. This natural constituent has shown promise in combating *Aspergillus Flavus* and *Aspergillus niger* which are two harmful fungi. It's a promising alternative to expensive synthetic treatments and offering a cost-effective and organic solution for fungal-related diseases.

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