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Mentha Longifolia: A Review on Botanical Distribution, Phytochemical Components and Pharmacological Functions

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Abstract:

Phytochemicals from plants are known for their antiseptics, bactericidal, virucidal and fungicidal, and medicinal properties and their fragrance, which find uses in preservation of foods and locally anaesthetic remedies. They include alkaloids, flavonoids, tannins, terpenoids, saponins, glycosides, phenols amongst others. There are over 50, 000 species of medicinal plants reported by WHO and many of these plants are still underutilized. Among the potential medicinal plant is *Mentha longifolia* which is found to be loaded with several bioactive compounds which performs a wide range of activities including; antioxidant, antiviral, antifungal, antimicrobial, immune-stimulatory, hepato-protective and anti-helminthic. These phytochemicals are safe, eco-friendly and effective when fed to animals and could be used as potential alternative to antibiotics. Exploring the potentials in *Mentha longifolia* will further promote food safety and full utilization of the plant.

Keywords: *Mentha longifolia*, phytochemicals, bioactive compounds, antimicrobial

Introduction

Medicinal plants are of great importance to the health of individuals and communities with great potentials for pharmaceutical and nutraceutical applications. The medicinal value of these plants lies in some chemical substances that produce a definite physiological action on the human body and these chemical substances are called phytochemicals (Shittu et al., 2021; Adewale et al., 2021). These are non- nutritive chemicals that are found in the leaves, stems, root, seeds, flowers, buds amongst others with protective or disease preventive properties (Singh et al., 2023; Alagbe et al., 2023). There are at least fourteen classes of secondary metabolites (phytochemicals) from fruits that exert

biological activities and can potentially be used to promote human health. These include alkaloids, cyanogenic glycosides, flavonoids, glucosinolates, monoterpenes, sesquiterpenes, tetraterpenes, triterpenes, saponins and steroids (Singh et al., 2021; Alagbe, 2021). Several of these metabolites have therapeutic properties and their concentration in the plant tissues is considered as the main factor to evaluate the therapeutic value and quality of a given herb (Newman et al., 2000; Alagbe et al., 2021).

Botanical description and distribution

Mentha longifolia is a perennial herbs widely distributed in South Africa (van Wyk *et al*., 2009). It is also common in other parts of southern Africa, Europe, the Mediterranean region and eastern parts into Asia (Razavi *et al*., 2012; 2009) as well as in temperate parts of Eurasia and Australia (Ali *et al*., 2006). The plant has creeping rhizomes, and erect flowering stems and can reach up to 1.5 m in height under optimum growth conditions but normally grows in the range of 0.5-1 m in height (van Wyk *et al*., 2009). All parts are highly aromatic with a strong typical mint ordor (van Wyk *et al*., 2009) and a pungent with slightly bitter taste (Al-Ankari *et al*., 2004). Leaves appear opposite to each other in pairs along the stems, which are squares in cross sections. The soft leaves are described as coarsely hairy, ovate and lanceolate and the edges sparsely toothed between 45-100 mm long, and 72 mm wide (Voss et al., 2007). The colour of the leaves varies from light dark green to grey. The small white or pale purple flowers are borne in elongated clusters at the tips of the stems (Voon *et al*., 2012).

Medicinal applications

Mentha longifolia is known as a traditional remedy for coughs, colds, asthma and other respiratory ailments. It is also used as therapy against fever, indigestion, flatulence, urinary tract infections, painful menstruation (Voon et al., 2012), headaches, hysteria and birth stimulant in delayed pregnancies, (van Wyk et al., 2009; Philander, 2011). It is believed to be diaphoretic and antispasmodic and externally used for treating wounds and swollen glands (van Wyk et al., 2009; Philander, 2011). In Iran folk medicine for centuries, *M. longifolia* has been described as a tonic, carminative, digestive, stomachic, antispasmodic and an anti-inflammatory agent (Razavi et al., 2012). The teas or decoctions prepared from the plant material have been shown to increase diuresis and flatulence, treat metabolism, liver and gall disorders and rheumatism (Šarić-Kundalić, 2010).

Phytochemical composition of *Mentha longifolia*

The phytochemical screening of *M. longifolia* extracts revealed the following bioactive chemical constituents alkaloids, flavonoids, cardiac glycosides, phenolics, tannins, monoterpene ketones, saponins and terpenes (Ashfaq et al., 2012). The major phenolic constituents are caffeic acid derivatives (Tekeľova et al., 2009) and polar flavonoids (Akroum et al., 2009). The flavonoids described within M. longifolia are flavones, flavanones and their glycosidic forms including luteolin, apigenin, eriodictyol, hesperetin and their glycosides (Tekeľova et al., 2009) as well as quercetin and kaempferol glycosylated derivatives (Al-Bayati, 2009). These compounds are attributed to the plant's antimicrobial activities. It has been shown that different glycosylated flavonoids exert a synergistic effect on antimicrobial activity (Al-Bayati, 2009; Razavi et al., 2012). The presence of polyphenols, flavonoids and condensed tannins in this plant is correlated with the high antioxidant activities in its aerial part (Hajlaoui et al., 2009), although van Wyk et al. (2009); Hajlaoui et al. (2010) reported a

rather weak antioxidant activity. High levels of hydroxycinnamic derivatives (THD) linked to antioxidant scavenging capacity (Gaspar et al., 2009) were observed in M. longifolia (Tekeľova et al., 2009). Also, *M. longifolia* contains bioflavonoids such as hesperidin said to improve capillary function by relieving capillary impairment and venous insufficiency of the lower limbs (Palma et al., 2007). Ali et al. (2006) reported ceramides isolated from this plant. The volatile oils of M. longifolia contain monoterpeniods such as carvone, limonene, methone and menthol (van Wyk et al., 2009) as well as octanol, linalool, terpinene, piperitone (Oyedemi et al., 2011). Volatile oils are known for their decongestant and antiseptic effects though they will not be discussed in this review.

Pharmacological effects of *Mentha longifolia*

Antimicrobial properties of *Mentha longifolia*

It has been suggested that the phytochemical constituents of this plant have beneficial effects which may act as growth promoters, inhibit intestinal pathogenic organisms, and improve digestion and absorption in broilers (Al-Ankari *et al*., 2004; Shittu and Alagbe, 2020). *M. longifolia* potentially has active components that can be of value in the development of feed and food additives (Hajlaoui *et al*., 2009) to reduce the effects of mycotoxin exposure in animals. Mabona et al. (2013); Liska (1998) reported antimicrobial activity of M. longifolia against Staphylococus aureus, Streptococcus epidermidis, Pseudomonas aeruginosa, Candida albicans, Brevibacillus agri, Propionibacterium acnes, Trichophyton mentagrophytes, and Microsporum canis. It was interesting to note that M. longifolia also possess excellent inhibitory effects against plant pathogen E. carotavora and S. sclerotiorum.

Phenoloic properties of *Mentha longifolia*

Phenolic compounds of mints poses a wide array of pharmacological properties, i.e., they may perform one or more of antioxidant (Mimica-Dukic and Bozin, 2008; Mac-Donald et al., 2010), antiulcer, cytoprotective, cholagogue, chemopreventive, anti-inflammatory, antidiabetogenic (Mimica-Dukić and Bozin, 2008), antimicrobial (Al-Bayati, 2009) and heptoprotective properties (Mimica-Dukić et al., 1999).

Conclusion

Mentha longifolia contains several bioactive compounds with numerous medicinal properties. Extract from the plant can inhibit the activities of some pathogenic organisms and could be used as botanical alternative to conventional antibiotics.

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