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Bioactivity and health effects of *Mentha spicata*

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Abstract

Traditional medicine provides an important health care service and can be used as alternate therapy. Plants are rich in phytochemical compounds that offer a source of dietary ingredients used to treat various ailments and problems. Spearmint (*Mentha spicata* L) belongs to the family Lamiaceae and is a rich source of polyphenols. These polyphenols have shown numerous of biological activities and health benefits. Therefore, the present study shows the bioactivity and health effects of spearmint.

Introduction

Spearmint (*Mentha spicata* L), belongs to the family Lamiaceae. The plants of this family are a rich source of polyphenols and thus possessing strong antioxidant properties [1,2]. Spearmint is indigenous to northern England [3] and is cultivated in areas with climate ranging from tropical to temperate, such as America, Europe, China, South Africa and Brazil [4,5]. Nowadays, spearmint is widely grown throughout all regions in the world [6].

Spearmint is also known as brown mint, garden mint, lady's mint, and sage of Bethlehem [3]. Spearmint is a creeping rhizomatous [7] and perennial herbs [8]. The leaves are broad and sharply serrate. The trademark of mint family is the stem which is in square-shaped [9]. Spearmint produces rightly and long pink or white flowers in slender spikes. Spearmint leaves possess a characteristic aromatic odour and pungent taste. However, in contrast to peppermint and Japanese mint, the cooling after-effect is absent in spearmint [8,9].

Constituents

The constituents found in spearmint are shown in Table 1. Carvone, a phenolic compound, is the main constituent found in spearmint oil, followed by limonene [7,10]. Carvone is reported to be potential in inhibiting bacterial growth [11], as well as to act as fungicide [12] and insect repellent [13]. Carvone also reversibly suppresses the sprouting in stored potatoes or flower bulbs [14].

Table 1. Result of MS essential oil analysis by gas chromatography-mass spectrometry

Compound	Percentage (%)	Compound	Percentage (%)
β - myrcene	0.25	Trans-carveol	0.30
Limonene	11.50	Carvone	78.76
Γ-terpinene	0.16	Dihydrocarvyl acetate	0.57
Menthone	1.01	L-carveol	0.32
Menthol	1.00	β - bourbonene	1.23
Terpinen-4-ol	0.99	Trans-caryophyllene	1.04
α-terpinol	0.31	γ - amorphene	0.21
Dihydrocarveol	0.22	α-amorphene	0.16
Cis-dihydrocarveol	1.43	Other compounds	0.11
Dihydrocarvone	0.43	Total	100.00

(Adapted from Shahbazi, [35])

Carvone renders the characteristic smell of spearmint. The smell is smooth and near analogous to fennel oil [15]. However, (S)-carvone and (R)- carvone contribute to the odor of spearmint and caraway seeds respectively. Both are enantiomers of a biological material but elicit different response. In addition, S-carvone possess high antioxidant activity [9].

Bioactivity

It is reported that spearmint possesses antioxidant activity [16] on account of the presence of phenolic acids, flavonoids, carvone and ascorbic acid in leaves [17]. According to Scherer, *et al.* [18], spearmint can become an alternate form for synthetic antioxidants which bring harmful effects.

The biological activities of spearmint also include anti-inflammatory, antimicrobial and sedative [19]. The good antimicrobial activity is attributed to the high concentration of carvone [18]. In addition, spearmint is carminative, antispasmodic and diuretic [20].

Uses

Both fresh and dried spearmint plants are widely used in a variety of application [21]. Since ancient times, both western and eastern cultures have been practiced spearmint as medical and aromatic plants [22]. In term of biological uses, spearmint acts as insecticides [23], antispasmodics and anti-platelets [24]. Moreover, spearmint is used as antimicrobial [25] and antioxidant agents [26].

In term of medical uses, spearmint is considered as an herbal medicine in folkloric remedies for treating of colds and flu, respiratory tract problems, gastralgia, hemorrhoids, and stomachache [20,27,28]. Spearmint is extracted in the form of oil and is regularly used in medicine [15]. Bensabah, *et al.* [29] states that spearmint leaves are

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generally taken as a tea in which its carminative properties can help to treat digestive disorders, fever and minor ailments [3]. Furthermore, spearmint has broadly applied to treat various illnesses. For instances, nausea, vomiting and gastrointestinal disorders [30,31].

In term of food uses, spearmint is used in food, confectionery, and chewing gum industries [15,21,29,32]. Spearmint contributes to food preservation [18] and imparts food taste and aroma [32]. Spearmint is used in Iran as flavouring agent in food products such as cheese and dough [33]. Besides, spearmint is added in Indian and Italian cuisine, either in fresh or dried form, to fish and shellfish plates before or after cooking [20,34]. Owing to the antioxidant, antiradical and chelating properties it possesses, the incorporation of spearmint in food can help to maintain the equilibrium of redox status in organism as well as to improve safety and effect on human wellbeing [10]. Spearmint has been used broadly in cosmetic and soap [21,29,32], as well as toothpaste, breath freshener and antiseptic mouth rinse [30,31].

Conclusion

Phenolic compounds in spearmint were exhibited many biological activities. Thus, spearmint has great potential to be used in medical and functional foods applications. Further studies and advanced researches are needed to enhance its properties and increase its applications.

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