



MELISSA AFFICINALIS L AND ITS MEDICINAL PROPERTIES

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Annotation

This article provides information about *Melissa officinalis* L and its medicinal properties, chemical composition, research on it and preparation of extracts from it.

Keywords: *Melissa officinalis* L, traditional usage, antioxidant properties, oxidative stress, oxidative damage, ROS

Introduction

Melissa officinalis is a plant cultivated in some parts of Iran. The leaves of lemon balm, *Melissa officinalis* L (Lamiaceae), are used in Iranian folk medicine for their digestive, carminative, antispasmodic, sedative, analgesic, tonic, and diuretic properties, as well as for functional gastrointestinal disorders. This review article was aimed not only to introduce *Melissa officinalis* (its growth condition, its chemical compounds, and its traditional usages) but also to overview its antioxidant properties in detail. This review was carried out by searching studies in PubMed, Medline, Web of Science, and IranMedex databases up to 2016. The search terms used were “*Melissa officinalis* L,” “antioxidant properties,” “oxidative stress,” “oxidative damage”, “ROS.” Articles whose full texts were not available were excluded from the study. In this study, firstly, traditional usage of this herb was reviewed, including antimicrobial activity (antiparasitic, antibacterial, antiviral, etc), antispasmodic, and insomnia properties. Then, its antioxidant properties were overviewed. Various studies have shown that *Melissa officinalis* L possesses high amount of antioxidant activity through its chemical compounds including high amount of flavonoids, rosmarinic acid, gallic acid, phenolic contents. Many studies confirmed the antioxidative effects of *Melissa officinalis*; thus, its effect in preventing and treating oxidative stress-related diseases might be reliable. The use of medicinal herbs and herbal medicines is an age-old tradition, and the recent progress in modern therapeutics has stimulated the use of natural products worldwide for diverse ailments and diseases. In traditional medicine, folk people used medicinal plants in diverse manners to treat diseases. Traditional medicine is popular in all regions of the world, and its use is rapidly expanding even in developed countries. For example, in China, traditional herbal preparations account for 30% to 50% of the total medicinal consumption, and now the annual global market for herbal medicine is over US\$60 billion. The World Health Organization estimated that over 80% of the people in developing countries rely on traditional remedies such as herbs for their daily needs and about 855 traditional medicines include crude plant extracts. This means that about 3.5 to 4 billion of the global population rely on plants resources for drugs. However, the traditional usages of just some of these medicinal plants have been investigated in vitro and clinical trial studies.



In fact, herbal medicines possessing natural essential chemical compounds in their profile could fulfill the primary needs and prerequisite of human beings to cure their diseases. It has been reported that natural products, their derivatives and analogs, represent over 50% of all drugs in clinical use, in which natural products derived from higher plants represent about 25% of the total. The diversity of natural compounds in herbs and their different functions in preventing and treating different diseases on the one hand and their property of being natural and comfortable with the body and not having adverse effects providing their proper usage induces people toward their consumption; educated public and health care professionals have enormous interests concentrating studies on these herbs and diagnosing their therapeutic properties, but there is a great deal of confusion about their identification, effectiveness, therapeutic dosage, toxicity, standardization, and regulation. To achieve this purpose, lots of studies have been carried out to concentrate on the identification of medicinal herbs triggering economically remarkable chances for farmers and related cultivation, harvesting, and agronomic conditions of the herb to generate favorable a chemical and pharmacological profile. Economically, cultivating *Melissa officinalis* is cost-effective, and compared with the economic indicators of traditional crops grown on fertilized land, this herb provides much higher profits. This review article is aimed not only to introduce *Melissa officinalis* (its growth condition, its chemical compounds, and its traditional usages) but also to overview its antioxidant properties in detail.

Taxonomy. *Melissa officinalis* L, also known as lemon balm, bee balm, honey balm, is a perennial herb. It is a member of the Lamiaceae (mint) family, and lemon balm (*Melissa officinalis*) belongs to a genus that includes 5 species of perennial herbs native to Europe, Central Asia, and Iran. Although *Melissa officinalis* originated primarily in Southern Europe, it is now naturalized around the world, from North America to New Zealand. Lemon balm occurs naturally in sandy and scrubby areas but has also been reported to grow on damp wasteland, at elevations ranging from sea level to the mountains. In Iran, this plant is known locally by the names Badranjbooye, Varangboo, and Faranjmoshk.

The taxonomical classification of this plant is as follows: Kingdom: Plantae; Division: Tracheophyta; Subdivision: Spermatophyta; Class: Magnoliopsida; Superorder: Asteranae; Order: Lamiales; Family: Lamiaceae; Genus: *Melissa*; Species: *Melissa officinalis* L.

Traditional Uses. Historically lemon balm has been said to possess sedative/tranquilizing, anti-gas, fever-reducing, antibacterial, spasmolytic, hypotensive, memory-enhancing, menstrual-inducing, and thyroid-related effects; antiviral and antioxidant activities; antifungal, antiparasitic, and antispasmolytic activities; flatulence; asthma; bronchitis; amenorrhea; cardiac failure; arrhythmias; ulcers; and wounds. Besides, it has been said that it is effective in treatment of headaches, indigestion, colic, nausea, nervousness, anemia, vertigo, syncope, malaise, insomnia, epilepsy, depression, psychosis, and hysteria.

Chemical Compounds. The leaf of ***Melissa officinalis*** contains flavonoids (quercitrin, rhamnocitrin, luteolin), polyphenolic compounds (rosmarinic acid, caffeic acid, and protocatechuic



acid), monoterpenoid aldehyde, monoterpane glycosides, triterpenes (ursolic and oleanolic acids), sesquiterpenes, tannins, and essential oils (citral).⁶⁴ Thirty-three components were identified representing 89.30% of the total oil in the composition of the leaf (Table 1). Six predominant components followed in the essential oils from Sefrou lemon balm were citronellal (14.40%), isogeraniol (6.40%), geraniol acetate (10.20%), nerol acetate (5.10%), caryophyllene (8.10%), and caryophyllene oxide (11.00%), representing 55.20% of the total oil.

The virucidal and antiviral effects of *Melissa officinalis* L extracts (M1, M3, M3, and M4) with respect to herpes simplex virus type 1 was investigated, and no significant values of inhibiting activity of M1, M2, and M3 on the same virus in vitro or in vivo were demonstrated. Caffeic, rosmarinic, and ferulic acids contribute to antiviral activity of *Melissa officinalis* L. In a double-blind study, a specially prepared dried extract from *Melissa* leaves was investigated and the antiviral activity in vitro of this plant against herpes simplex infections was confirmed. Besides, the treatment with this plant was shown to be effective at very early stages of the infection. A double-blind, placebo-controlled, randomized trial was carried out with the aim of proving efficacy of standardized balm mint cream for the therapy of herpes simplex labialis. The tested formulation was effective for the treatment of this disease.

In a study, water extracts of 6 different herbs of the Lamiaceae family (dittany, lemon balm, mint, sage, siderites, and sweet marjoram) were investigated for their antioxidative properties. The extracts were examined for their effect against lipid oxidation in comparison to a tea water extract. It showed that the extract of *Melissa* was rich in bound forms of phenolic compounds such as hydroxycinnamic acids and flavonoids, rosmarinic and caffeic acids. In another study, essential oil, ethanolic extract, and decoction of 10 plant species from interior Portugal were analyzed for their activity toward acetyl cholinesterase enzyme and their antioxidant activity. *Melissa officinalis* and *Mentha suaveolens* showed acetyl cholinesterase inhibitory capacity is higher than 50% in the essential oil fraction. *Melissa officinalis* showed both high acetyl cholinesterase inhibitory capacity and antioxidant activity. Besides, *Melissa officinalis* showed appreciable antioxidant activity only in the polar fractions. Antioxidant activity of different fractions from *Melissa officinalis* extract was evaluated. Ethyl acetate fraction presented the highest flavonoids content as well as the antioxidant activities when compared with other tested fractions.

Conclusion

In this article, first traditional usages of ***Melissa officinalis*** and second its antioxidant properties were reviewed in detail. Regarding its traditional usage, antimicrobial activity (antiparasitic, antibacterial, antiviral, etc), antispasmodic, insomnia properties were reported. Many studies confirmed the antioxidative effects of ***Melissa officinalis***; thus, its effect in preventing and treating oxidative stress-related diseases might be reliable. The results of numerous studies on antioxidant or radical scavenging effects may be a basis for detailed in vivo research on anti-inflammatory activities of this plant. Further studies are needed to conduct clinical trials on cancer to develop new anticancer drugs. Future research should be focused on the relationship between the total antioxidant capacity and



the content, as well as composition of antioxidants. Further studies are also required to study the mechanism of antioxidant activity of phenolic compounds. Such studies would provide a greater understanding of how ROS scavenging and metal-binding antioxidant mechanisms afford oxidative protection as well as facilitate improved antioxidant design for the treatment and prevention of disease. We should also investigate the interrelationship between phenolic compounds and antioxidant/anticancer activity to illustrate possible mechanisms for cancer prevention and treatment.

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