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## Melissa officinalis L. - A review of its traditional uses, phytochemistry and pharmacology.

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### Abstract

**ETHNOPHARMACOLOGICAL RELEVANCE:** Melissa officinalis L. is a medicinal plant that has long been used in different ethno-medical systems especially in the European Traditional Medicine and the Iranian Traditional Medicine for the treatment of several diseases. It is also widely used as a vegetable and to add flavor to dishes

**AIM OF THE REVIEW:** This review aimed to provide a summary on the botanical characterization, traditional uses, phytochemistry, pharmacological activities, pharmacokinetics and toxicity of M. officinalis, and discusses research gaps and future opportunities for investigations on this plant.

**MATERIALS AND METHODS:** We extensively reviewed major unpublished old texts, and published and electronic literature on traditional medicines of different regions of the world to find traditional uses of M. officinalis. Electronic databases including Web of Science, PubMed, ScienceDirect, Google Scholar and Scopus were searched to find articles (published between 1956 and 2015) on pharmacology and phytochemistry of M. officinalis.

**RESULTS:** Traditional uses of M. officinalis have been recorded mostly in European countries, Mediterranean region and Middle East countries. Phytochemical investigations revealed that this plant contains volatile compounds, triterpenoids, phenolic acids and flavonoids. Crude extracts and pure compounds isolated from M. officinalis exhibited numerous pharmacological effects, from which only anxiolytic, antiviral and antispasmodic activities of this plant as well as its effects on mood, cognition and memory have been shown in clinical trials. AChE inhibitory activity, stimulation of the acetylcholine and GABAA receptors, as well as inhibition of matrix metallo proteinase-2 are the main mechanisms proposed for the widely discussed neurological effects of this plant.

**CONCLUSIONS:** Modern pharmacological studies have now validated many traditional uses of M. officinalis. The data reviewed here revealed that M. officinalis is a potential source for the treatment of a wide range of diseases especially anxiety and some other CNS disorders, though confirmatory trials are warranted to substantiate these effects in the clinical setting. Data regarding many aspects of this plant such as mechanisms of actions, pharmacokinetics, adverse effects of the extracts, potential interactions with standard-of-care medications and active compounds is still limited which call for additional studies particularly in humans.

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**KEYWORDS:** Biological activity; Lemon balm; Melissa officinalis; Phytochemistry; Traditional medicine

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