

## Traditional Ethnobotanical Applications of *Melissa officinalis* for Niš district

Vesna Stankov Jovanović<sup>1</sup>, Katarina Stepić<sup>1</sup>, Tijana Jovanović<sup>1</sup>, Slobodan Ćirić<sup>1\*</sup>, Radomir Ljupković<sup>1</sup>, Jovana Ickovski<sup>1</sup>, Marija Marković<sup>2</sup>

1 - University of Niš, Faculty of Sciences and Mathematics, Višegradska 33, 18106 Niš, Serbia

2 – University of Belgrade, Institute of Forestry, Kneza Visislava 3, 11030 Belgrade, Serbia

Vesna Stankov Jovanović: [vesna.stankov-jovanovic@pmf.edu.rs](mailto:vesna.stankov-jovanovic@pmf.edu.rs), <https://orcid.org/0000-0001-7885-0476>

Katarina Stepić: [katarina.stepic@pmf.edu.rs](mailto:katarina.stepic@pmf.edu.rs), <https://orcid.org/0000-0003-2327-1228>

Tijana Jovanović: [tijana.jovanovic@pmf.edu.rs](mailto:tijana.jovanovic@pmf.edu.rs), <https://orcid.org/0000-0001-5160-7732>

Slobodan Ćirić: [slobodan.ciric@pmf.edu.rs](mailto:slobodan.ciric@pmf.edu.rs), <https://orcid.org/0000-0002-6285-3127>

Radomir Ljupković: [radomir.ljupkovic@pmf.edu.rs](mailto:radomir.ljupkovic@pmf.edu.rs), <https://orcid.org/0000-0002-5828-1816>

Jovana Ickovski: [jovana.ickovski@pmf.edu.rs](mailto:jovana.ickovski@pmf.edu.rs), <https://orcid.org/0000-0002-3407-6498>

Marija Marković: [marijam@pmf.edu.rs](mailto:marijam@pmf.edu.rs), <https://orcid.org/0000-0002-6070-6844>

### ABSTRACT

*Melissa officinalis* (lemon balm) has been utilized for centuries in traditional medicine for its diverse therapeutic properties. This study explores its traditional applications and evaluates the pharmacological evidence supporting its use in treating various ailments. The bioactive compounds present in *M. officinalis*, such as rosmarinic acid, flavonoids, and essential oils, are responsible for its notable effects, including anxiolytic, antimicrobial, antioxidant, and digestive benefits. Traditional uses of *M. officinalis* in Niš District, southeastern Serbia, spanning from alleviating stress, anxiety and sleep problems to treating gastrointestinal discomfort, align with findings from contemporary scientific research. Despite its extensive history of use and integration in modern medicinal therapeutic practices, further clinical investigations are needed to substantiate its safety, efficacy, and mechanisms of action. This paper highlights the significance of *M. officinalis* as a bridge between traditional knowledge and modern medicinal applications, as well as the importance of preserving traditional knowledge.

*Keywords:* *Melissa officinalis*, ethnobotany, medicinal plants, therapeutic effects, traditional medicine, traditional knowledge

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\* Corresponding author: [slobodan.ciric@pmf.edu.rs](mailto:slobodan.ciric@pmf.edu.rs)

## Introduction

Ethnobotany has an important role in understanding traditional medicinal knowledge and its applications in healthcare systems. Traditional medicinal herbs have long been an essential part of indigenous cultures all over the world, frequently serving as the main source of healthcare in specific areas (Mekonnen et al., 2022). These plants not only treat a variety of illnesses, but they also provide information about sustainable drug research and discovery (Fabricant and Fansworth, 2001). Ethnobotanical studies aim to document and analyze traditional knowledge, emphasizing the cultural significance, preparation methods, and therapeutic uses of plants. Furthermore, it has been shown that integrating ethnobotanical knowledge with modern pharmacology can help to combine traditional and scientific medical practices (Cunningham, 2014).

*Melissa officinalis* L. is perennial herb from the family Lamiaceae, where many plants from this family are used as medicinal plants in traditional medicine due to their contributions to human health. For decades, *M. officinalis*, has been used in folk medicine to cure a variety of illnesses (Table 1), especially those related to anxiety, digestive issues, and sleep disorders. In recent decades, scientific study on its pharmacological qualities has developed despite its widespread usage in traditional herbal medicine, revealing a vast range of bioactive compounds that contribute to its health benefits (Chung-Hsiung et al., 2024; Shakeri et al., 2016). Among the most significant constituents are terpenes, flavonoids and phenolic acids. The primary active ingredients include citronellal, geranial, neral, and rosmarinic and caffeic acid (Miraj et al., 2017). The pharmacologically important components contribute to the herb's antioxidant, anti-inflammatory, antimicrobial, and anxiolytic properties.

The essential oil (EO) of *M. officinalis* is rich in monoterpenes such as citronellal and geranial, which are responsible for antimicrobial (Dukić et al., 2004), and anti-inflammatory activity (Bounihi et al., 2013). Additionally, the anti-inflammatory properties of *M. officinalis*'s EO rich in citral and rosmarinic acid have also been demonstrated, (Miraj et al., 2017). The lemon balm essential oil's relaxing effects make it effective in reducing anxiety and promoting sleep (Sharifi-Rad et al., 2021).

Polar extracts of *M. officinalis* contain rosmarinic and caffeic acids in significant amounts, which are responsible for antioxidant and antimicrobial activities. Previous studies have identified several flavonoids, including luteolin and apigenin, as well as phenolic acids (Miraj et al., 2017). These mentioned compounds are well-known as antioxidants, which importance is the protection of cells from oxidative stress (<https://www.reviewsll.com/gluco-shield-pro-review-a-comprehensive-analysis-of-the-pros-and-cons/>) and contribute to the herb's anti-inflammatory and antidiabetic activities (Draganić, 2022).

**Table 1.** Biological properties and pharmacological uses of *M. officinalis*.

Properties/Use	Description	References
Antioxidant	Scavenge free radicals and prevent oxidative damage.	Miraj et al., 2016
Antimicrobial	Inhibits the growth of bacteria and fungi.	Carvalho et al., 2021
Anti-inflammatory	Reduces inflammation.	Bounihi et al., 2013
Antiviral	Effective against virus and viral infections.	Allahverdyev et al., 2004
Anxiolytic	Reduces anxiety and promotes relaxation.	Stojanović et al., 2023
Sedative	Enhances sleep quality.	Demirci et al., 2015
Digestive aid	Reduces gastrointestinal discomfort.	Kapalka, G. M., 2010
Cognitive enhancer	Improves concentration and memory	Nasari et al, 2021
Gastroprotective	Alleviate gastric disorders	Juee et al., 2023
Wound healing	Applied as a poultice to treat wounds and prevent infections.	Arbastan et al., 2014
Menstrual pain relief	Used to alleviate menstrual cramps and hormonal imbalances.	Bounihi et al., 2013
Culinary use	Leaves and essential oils added for flavoring food and beverages.	Carvalho et al., 2023

The subject of this study was to determine whether and to what extent is *M. officinalis* used in traditional medicine in Niš district. The aim was to gather knowledge about application of *M. officinalis* and in which forms it is prepared. The results were collected through surveys and consisted of general data about respondents (gender, age, place of living) and questions about application of plants, preparation methods, and treated illnesses.

## Experimental

The study was conducted in the Niš district, a region located in southeastern Serbia. The specific areas surveyed include rural villages and urban settings where traditional knowledge about medicinal plants is still actively practiced. A field survey was conducted for 2023 and 2024 year. In total, 100 participants were tested through an online survey. Before collecting data, informed consent was secured from all participants in compliance with ethical guidelines for ethnobotanical investigation (Jones, 2017). The study protocol was approved by the scientific project Ethno-

pharmacological study of the region of southeastern Serbia, O-02-17, supported by the Serbian Academy of Sciences and Arts.

Among 100 participants, 14 reported using *M. officinalis* leaves for tea with the intention of curing the nervous system and gastrointestinal tract.

## Results and Discussion

The present study included 100 participants aged 18 to 70, with an average age of 50. Ladies represented 60% and men 40%. Most participants had been exposed to traditional herbal practices, indicating a deep cultural inheritance of ethnobotanical knowledge in Nis District. Among 100 participants, 14 reported the use of lemon balm, 6 of them bought the tea in the market, and 8 collect a fresh plant. Amidst these participants that mentioned the use of lemon balm, many of them (9 participants) heard about the medicinal uses of this plant from other people which contributes to the preservation of traditional application knowledge of this medicinal plant. All participants consume *M. officinalis* in the form of tea using leaves of dried plant, where 4 participants reported using local wild plants and 4 of the participants mentioned they cultivate *M. officinalis* plant while the rest of them reported that they buy lemon balm tea (Table 2).

**Table 2.** Traditional use of *M. officinalis* in Niš District

City/Village	Urban or Rural	Gender	Bought or harvested	Part of the plant	Consumed form	Use
Niš	Urban	Female	Bought	Leaves	Tea	Calming effect
Niš	Urban	Female	Harvested	Leaves	Tea	Insomnia
Svrljiško selo	Rural	Female	Harvested	Leaves	Tea, Tincture	Insomnia
Draguša	Rural	Female	Harvested	Leaves	Tea	Gastritis
Bujanovac	Rural	Female	Bought	Leaves	Tea	Stomach pains
Niš	Urban	Female	Harvested	Leaves	Tea	Stomach pains, calming the nervous system
Niš	Urban	Female	Harvested	Leaves	Tea	Depression, insomnia, mental health conditions
Niš	Urban	Male	Bought	Leaves	Tea	Stomach pains, sore throat, insomnia, calming effect

Zaplanje	Rural	Female	Harvested	Leaves	Tea	Cold
Niš	Urban	Female	Harvested	Leaves	Tea	Calming effect, migraine
Niš	Urban	Female	Bought	Leaves	Tea	Stomach pains, analgetic effect, overall calming effect
Niš	Urban	Female	Harvested	Leaves	Tea	Stomach pains, overall calming effect
Niš	Urban	Female	Bought	Leaves	Tea, Oil	Stomach pains, calming effect, insomnia
Zaplanje	Rural	Female	Bought	Leaves	Tea, Tincture	Restlessness, insomnia

A majority of 14 respondents consider tea, EO and tinctures respectively of *M. officinalis* as a remedy for anxiety, stress and sleep-related problems (Figure 1). Some of the participants reported using *M. officinalis* in digestive disorders-related problems (6 participants), while 1 participant mentioned the use of *M. officinalis* tea for treating gastritis, and 1 participant mentioned the use of *M. officinalis* tea for menstrual pain relief.

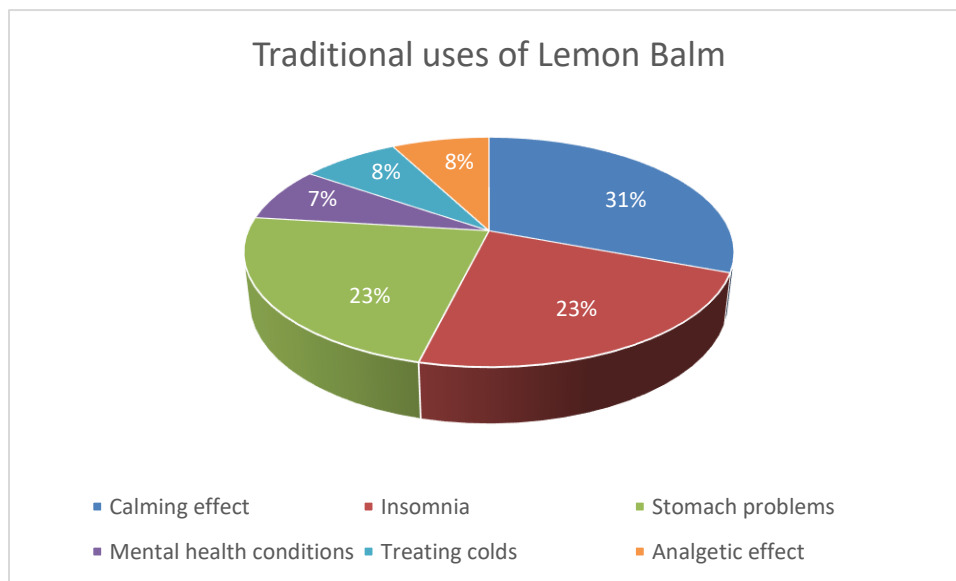


Figure 1. Traditional application of *M. officinalis*

The lemon balm's prominence in traditional practices highlights its deep cultural and ethnobotanical significance. The documented applications align with pharmacological studies

mentioned in Table 1 demonstrating the potential integration of this plant into modern medicine. It is a plant utilized either in its dried form or through oil extraction, and it serves as an antibacterial, antiviral, and antioxidant agent (<https://foodly.tn/tips/4-790/>). It is also used as a treatment for nervousness and insomnia, and it is commonly used in traditional medicine to treat anxiety, and gastric disorders and is sometimes used for menstrual irregularities (Kapalka, 2011). The traditional use of lemon balm for managing anxiety and stress is supported by numerous studies, for example, Gihazizadeh et al. (2020) reported a positive effect in treating nervous system condition testing on a laboratory animal, while a clinical study approved the integration of *M. officinalis* remedies into modern medicine (Cases et al., 2010).

## Conclusion

The traditional medicinal applications of *M. officinalis* (lemon balm) underscore its enduring significance in herbal medicine and its integration into the therapeutic practices of modern medicine. Historically used for its calming, antiviral, and digestive properties, *M. officinalis* has demonstrated pharmacological activity supported by emerging scientific evidence. The bioactive compounds, including rosmarinic acid, flavonoids, and essential oil's components like terpenes and other volatile compounds, contribute to its anxiolytic, antimicrobial, and antioxidant effects. While traditional knowledge and scientific studies offer valuable insights into potential applications of *M. officinalis*, further research is essential to validate these insights through more clinical studies, optimize treatment methods, and explore its full pharmacological potential. Integrating traditional wisdom with modern science not only strengthens the reliability of herbal medicine but also offers a sustainable avenue for developing accessible and effective treatments, contributing to both public health and the conservation of ethnomedicinal practices. Besides proven bioactivity, in our study, *M. officinalis* was not often mentioned in our survey. The awareness among the people about the importance of *M. officinalis* can be raised by popular lectures, workshops, and promotional activities.

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## Conflict-of-Interest Statement

The authors declare that there is no conflict of interest regarding the publication of this paper.

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