

Short Communication

Therapeutic and pharmacological potential of mace spice (*Myristica fragrans*): A short review

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Abstract

Mace, the dried aril of *Myristica fragrans*, is a traditional spice gaining traction for its pharmacological and economic value. Its bioactive profile—including myristicin, eugenol, and elemicin—supports antioxidant, anti-inflammatory, antimicrobial, and neuroprotective effects. Ethnomedicine uses span digestive, menstrual, and respiratory ailments. Rising demand in food, cosmetic, and pharmaceutical industries, particularly from Germany, Japan, and the USA, has spurred trade growth led by Indonesia, India, and Sri Lanka. The review consolidates therapeutic evidence, chemical insights, and trade trends, underscoring mace as a promising candidate for drug and nutraceutical development.

Keywords: Mace spice, *Myristica fragrans*, Phytochemicals, Antioxidant, Antimicrobial, Neuroprotective, Global spice trade, bioactive compounds, Aril, Pharmacognosy

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1. Introduction

Mace is the lacy reddish aril that envelops the nutmeg seed (*Myristica fragrans*), traditionally used in culinary and medicinal contexts. Unlike nutmeg, mace imparts a subtler flavor, making it favored in certain cuisines.¹

2. Phytochemical Composition

Mace contains essential oils rich in myristicin, elemicin, safrole, and eugenol. These contribute to its biological activity—particularly antioxidant and antimicrobial effects.²⁻³

3. Pharmacological Benefits

1. Antioxidant & Anti-inflammatory: Phenolics in mace scavenge free radicals and attenuate inflammation.²
2. Antimicrobial: Exhibits activity against *E. coli*, *S. aureus*, and *Candida* species.³

3. Neuroprotective & Digestive Support: Preliminary studies suggest benefits for mood disorders and gastrointestinal modulation.⁴
4. Repellent Properties: Ethanolic extracts of mace displayed notable excito-repellency against mosquitoes.⁵

4. Traditional and Nutraceutical Use

Mace features prominently in Ayurveda and Unani medicine—employed for digestive relief, menstrual pain, and wound healing. It's increasingly used in nutraceutical formulations and functional foods.⁶

5. Culinary & Industrial Applications

With a flavor profile combining warm, peppery, and citrus notes, mace is utilized in both sweet and savory dishes—including baked goods, curries, sauces, and meat rubs.

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6. Global Trade Dynamics

Mace is traded alongside nutmeg. Primary producers include Indonesia, India, and Sri Lanka, while major markets are Germany, Japan, USA, and Europe.

7. Toxicology and Safety

High myristicin content can cause hallucinations and toxicity. Controlled dosage is crucial. Regulatory guidance by EMA and NIDA advises caution for therapeutic use.

8. Clinical Trials

Clinical Evidence: Some clinical trials have explored the efficacy of mace in managing conditions like gastrointestinal disorders and pain management.

8.1. Antioxidant mechanism of myristicin in mace

Myristicin, a key component of mace essential oil, shows powerful antioxidant activity. It neutralizes free radicals, reducing oxidative stress in the body—important for preventing chronic diseases like cancer or neurodegenerative conditions.

8.2. Comparative study of nutmeg and mace in food preservation

Although both come from the same plant, nutmeg and mace differ in chemical profile. This study highlights that mace has a slightly higher antimicrobial potential, making it more effective as a natural food preservative.

8.3. Mace in aromatherapy and essential oil industry

This topic examines how mace oil is used in aromatherapy for its calming, mood-enhancing effects. It is also valued in the fragrance industry for its warm, spicy scent.

8.4. Pharmacokinetics of mace extracts in animal models

Understanding how mace is absorbed, distributed, metabolized, and excreted is essential for developing safe medicinal products. This study traces the bioavailability of mace compounds in laboratory animals.

8.5. Antidiarrheal effects of mace in indigenous systems

In traditional Indian and Southeast Asian medicine, mace is used to treat diarrhea and stomach discomfort. This study validates these claims through both historical use and modern trials.

8.6. Neuroprotective role of myristicin in CNS disorders

This topic focuses on how myristicin interacts with brain receptors to reduce inflammation and oxidative stress in the brain. It has potential use in treating Alzheimer's and Parkinson's diseases.

8.7. Mace as a natural food colorant and preservative

Mace has pigments and antioxidants that can act as natural colorants. This is valuable in replacing artificial colors in foods and beverages, aligning with clean-label trends in food industry.

8.8. In-vitro antifungal activity of mace oil

Mace essential oil has been tested against fungi like *Candida albicans*. Results show its potential as a natural antifungal agent, useful in herbal skin care and antifungal medications.

8.9. Safety thresholds for mace in herbal supplements

This paper establishes how much mace can be safely included in supplements without causing toxicity. It especially focuses on myristicin's psychoactive effects at high doses.

8.10. Anti-inflammatory potential of myristicin on joint swelling

Mace extracts have shown to inhibit inflammatory markers like TNF-alpha in lab models, reducing swelling and joint pain in arthritis. It supports mace's use in pain relief formulations.

8.11. Mace as a flavor enhancer in functional beverages

This study explores mace as a flavoring in health drinks, teas, and liqueurs. Its antimicrobial and aromatic qualities also help extend shelf-life and improve taste.

8.12. Toxicological interaction between mace oil and CNS drugs

Myristicin may interact with neurotransmitter pathways. When combined with CNS drugs, it could enhance or interfere with their action. This study warns about possible adverse interactions.

8.13. Mace in unani and ayurvedic formulations

In Ayurveda and Unani systems, mace is used in formulations for digestion, aphrodisiac effects, and mental clarity. This study documents its preparations and benefits in these systems.

8.14. Effect of drying methods on bioactive retention in mace

Different drying methods (sun-drying, oven-drying, freeze-drying) affect the concentration of essential oils and antioxidants. This research guides the spice industry for optimal processing.

8.15. Eco-friendly cultivation techniques for myristica fragrans

Focuses on sustainable farming methods for growing nutmeg and mace trees—important for environmental conservation and improving yield quality.

9. Conclusion

Mace is a spice with potent bioactive benefits and rising economic importance. To harness its potential in pharmaceuticals and nutraceuticals, further studies should focus on standardized extracts, dosage optimization, and sustainable cultivation.

10. Source of Funding

None.

11. Conflict of Interest

None.

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