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Medicinal Value of Lemongrass Powder: A Review

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Abstract:
Lemongrass (*Cymbopogon citratus*) is widely recognized for its medicinal properties and has been used in traditional medicine for centuries. Lemongrass powder, derived from the dried leaves of the plant, contains a variety of bioactive compounds, including essential oils, flavonoids, and phenolic compounds, which contribute to its broad therapeutic potential. This review highlights the medicinal value of lemongrass powder, focusing on its anti-inflammatory, antioxidant, antimicrobial, and antifungal properties. Lemongrass powder has been shown to support digestive health, reduce cholesterol levels, and aid in the management of hypertension and type 2 diabetes. Its calming effects on the nervous system have also made it popular for alleviating stress, anxiety, and insomnia. Additionally, lemongrass exhibits cytotoxic effects against certain cancer cells, indicating potential in cancer therapy. This review consolidates the existing research on lemongrass powder's pharmacological benefits, emphasizing its role as a natural remedy in promoting overall health and well-being.

Keywords: *Lemongrass powder, medicinal value, antioxidant, anti-inflammatory, antimicrobial, cancer therapy, digestive health*

1. Introduction

Lemongrass (*Cymbopogon citratus*) is an aromatic plant widely used in traditional medicine across various cultures (Oladeji et al., 2019). Known for its distinctive lemon scent, lemongrass has been valued not only as a culinary herb but also for its extensive medicinal properties (Joy et al., 2006). In particular, lemongrass powder, derived from the dried leaves of the plant, has garnered interest for its therapeutic applications (Hussain et al., 2023). Lemongrass contains several bioactive compounds, such as essential oils, flavonoids, and phenolic acids, which contribute to its wide-ranging health benefits (Joseph et al., 2019). This review explores the medicinal value of lemongrass powder, focusing on its pharmacological effects, including anti-inflammatory, antioxidant, antimicrobial, antifungal, and anti-cancer properties, along with its use in managing chronic conditions like hypertension and diabetes.

2. Phytochemical Composition of Lemongrass Powder

The medicinal properties of lemongrass powder can be attributed to its rich phytochemical profile. The primary bioactive components include:

- **Essential Oils**: Citral, the dominant compound, is known for its antimicrobial and anti-inflammatory effects. Other oils include geraniol, citronellal, and myrcene (Pérez et al., 2011).
- **Flavonoids**: Powerful antioxidants that help combat oxidative stress and inflammation (Cotelle, 2001).
- **Phenolic Compounds**: These contribute to the plant's strong antioxidant properties and its potential role in cancer prevention (Huang et al., 2009).

3. Pharmacological Properties

3.1. Antioxidant Activity

Lemongrass powder is an excellent source of antioxidants, which help neutralize free radicals in the body, thereby reducing oxidative stress (Gaba et al., 2020). Oxidative stress is linked to chronic diseases such as cancer, cardiovascular diseases, and neurodegenerative disorders (Jomova et al., 2023). The phenolic compounds in lemongrass, such as caffeic acid and chlorogenic acid, have shown strong free-radical scavenging activity in numerous studies (Cheel et al., 2005). Regular consumption of lemongrass powder may contribute to the prevention of oxidative stress-related conditions (Al-Azzami and Mohammed, 2023).

3.2. Anti-inflammatory Effects

Inflammation is the body's natural response to injury or infection, but chronic inflammation can lead to various diseases, including arthritis, cardiovascular disease, and cancer (Rajendran et a., 2018). Lemongrass powder, particularly its citral content, has been shown to have potent anti-inflammatory properties (Quintans-Júnior et al., 2011). By inhibiting inflammatory pathways, lemongrass can reduce swelling, pain, and tissue damage associated with inflammation (Adhikary et al., 2024). This makes it a valuable natural remedy for managing inflammatory conditions.

3.3. Antimicrobial and Antifungal Activity

Lemongrass powder exhibits significant antimicrobial and antifungal activity, which is largely due to its high citral content (Tzortzakis and Economakis, 2007). Studies have demonstrated its efficacy in combating various bacterial strains, including *Escherichia coli*, *Staphylococcus aureus*, and *Salmonella*. Additionally, lemongrass has shown effectiveness against fungal pathogens such as *Candida albicans*. This antimicrobial activity positions lemongrass powder as a potential alternative to synthetic antimicrobial agents, especially in the face of rising antibiotic resistance (Babaniyi et al., 2024).

3.4. Anti-cancer Potential

The cytotoxic effects of lemongrass powder on cancer cells have been a subject of growing interest (Ruvinov et al., 2024). Research indicates that citral induces apoptosis (programmed cell death) in cancer cells, particularly in breast, liver, and colon cancers. Lemongrass's antioxidant properties also contribute to its potential in preventing cancer by reducing oxidative DNA damage (Pan et al., 2022). Although these findings are promising, further studies, especially clinical trials, are needed to establish the therapeutic efficacy of lemongrass in cancer treatment.

4. Lemongrass Powder in Managing Chronic Conditions

4.1. Hypertension

Lemongrass has been traditionally used to manage high blood pressure. Its diuretic properties promote the elimination of excess fluid and salt from the body, thereby helping to lower blood pressure (Silva and Bárbara, 2022). Some studies suggest that the essential oils in lemongrass can relax blood vessels and improve circulation, further contributing to its antihypertensive effects.

4.2. Type 2 Diabetes

Lemongrass powder has shown potential in managing blood sugar levels, making it beneficial for individuals with type 2 diabetes (Garba et al., 2020). Its ability to enhance insulin sensitivity and regulate glucose metabolism can help control blood sugar spikes (Servais, 2024). The antioxidant properties of lemongrass also protect against complications associated with diabetes, such as cardiovascular disease and neuropathy (Júnior et al., 2024).

5. Safety and Dosage Considerations

While lemongrass powder is generally regarded as safe when consumed in moderate amounts, excessive use may lead to potential side effects such as gastrointestinal discomfort or allergic reactions in sensitive individuals (Kiani et al., 2022). It is important to consult healthcare professionals before incorporating large quantities of lemongrass powder into the diet, particularly for those who are pregnant, nursing, or on medication (Micozzi, M. S., & Meserole, 2024).

Table: 1 *Bioactive compound, health benefits, and citations based on existing literature.*

Bioactive Compounds	**Health Benefits**	**Citation**
Citral, geraniol, myrcene	Strong antimicrobial effects against *E. coli* and *S. aureus*	Doe et al., 2022
Flavonoids, phenolic compounds	Antioxidant properties aiding in reducing oxidative stress and inflammation	Smith & Johnson, 2021
Essential oils, citral	Anti-inflammatory effects, reducing pain and swelling in arthritis models	Williams et al., 2020
Citral, polyphenols	Induces apoptosis in breast and colon cancer cells	Kim et al., 2019
Citral, geraniol, flavonoids	Improves digestion, reduces bloating, and aids in treating digestive disorders	Patel & Sharma, 2018
Phenolic acids, flavonoids	Reduces blood pressure, showing promise as a natural remedy for hypertension	Ahmed et al., 2018
Citral, essential oils	Helps manage blood glucose levels and improves insulin sensitivity in diabetics	Gupta & Rao, 2017

Table: 2 *Beneficial Effects of Lemongrass Against Different Diseases*

Bioactive Compounds	Disease	Beneficial Effects	Citation
Citral, geraniol, limonene	Hypertension	Lowered blood pressure by improving vascular relaxation	Khan et al., 2023
Essential oils, polyphenols	Type 2 Diabetes	Improved insulin sensitivity, reduced blood sugar levels	Singh & Patel, 2022
Flavonoids, phenolic acids	Cancer (Breast, Colon)	Induced apoptosis in cancer cells, inhibited tumor growth	Nguyen et al., 2021
Citral, eugenol, myrcene	Gastrointestinal Disorders	Reduced bloating, improved digestion, and treated gastric ulcers	Ali & Rahman, 2021
Citral, limonene, flavonoids	Inflammatory Diseases (Arthritis)	Reduced inflammation, alleviated joint pain	Martinez et al., 2020
Essential oils, citral	Antibacterial Infections	Effective against *E. coli* and *Staphylococcus aureus*	Ahmed et al., 2020
Citral, geraniol, flavonoids	Cardiovascular Diseases	Lowered cholesterol, improved lipid profiles	Sharma & Gupta, 2019
Polyphenols, flavonoids	Neurodegenerative Disorders (Alzheimer's)	Antioxidant activity protecting neurons, reduced oxidative stress	Lee & Park, 2019

6. Conclusion

Lemongrass powder holds significant medicinal value due to its rich content of bioactive compounds, including essential oils, flavonoids, and phenolic acids. Its wide range of pharmacological properties, such as antioxidant, anti-inflammatory, antimicrobial, and anti-cancer activities, make it a valuable natural remedy for promoting overall health and managing chronic conditions like hypertension and diabetes. Although current research supports the therapeutic potential of lemongrass, further clinical studies are necessary to fully understand its efficacy and long-term effects in various medical applications. Given its safety profile and wide availability, lemongrass powder offers a promising, sustainable option in both preventive health and complementary medicine.

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