

Medicinal and Preservative Applications of Garlic (*Allium Sativum*)

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SUMMARY

Garlic is an ingredient that enhances the sensory qualities of foods. Recent studies have shown that garlic contains Sulphur compounds, which possess ample health benefits. This review highlights the potential applications of garlic in the treatment and management of health issues as well as the benefits of garlic as an inhibitor in food spoilage and consequent use in food preservation.

INTRODUCTION

Garlic (*Allium sativum*) has been utilized for its medicinal properties for centuries, with a diverse range of therapeutic applications supported by scientific research. Its health benefits are attributed to various bioactive compounds, particularly organosulfur compounds such as allicin, which exhibit antioxidant, anti-inflammatory, and antimicrobial properties. These compounds contribute to garlic's effectiveness in managing several health conditions, including cardiovascular diseases, metabolic disorders, and certain cancers.

Medicinal applications of garlic

The therapeutic benefits of garlic include cardiovascular protection, immune system enhancement, and potential anticancer properties, which have been substantiated through numerous clinical studies (Zugaro et al., 2023).

Cardiovascular health

One of the most notable medical uses of garlic is in the management of cardiovascular health. Numerous studies have demonstrated that garlic can significantly lower blood pressure and improve lipid profiles. A systematic review and meta-analysis indicated that garlic preparations, including aged garlic extract and garlic powder, effectively reduce systolic and diastolic blood pressure in hypertensive patients (Ried et al., 2008). Additionally, garlic has been shown to lower total cholesterol levels, making it a potential adjunct therapy for hypercholesterolemia (Khoo and Aziz, 2009, Pittler and Ernst, 2007). The mechanisms behind these effects include the modulation of lipid metabolism and the reduction of oxidative stress, which are critical factors in the pathogenesis of cardiovascular diseases (Ansary et al., 2020).

Diabetes

Garlic also plays a significant role in managing metabolic disorders, particularly diabetes. Research has indicated that garlic supplementation can improve insulin sensitivity and lower blood glucose levels in diabetic patients (Thomson et al., 2015, Banigesh et al., 2017). The hypoglycemic effects of garlic are attributed to its ability to enhance insulin secretion and reduce insulin resistance, thereby aiding in glycemic control (Alhindi, 2022). Furthermore, garlic's antioxidant properties help mitigate oxidative stress, a common complication associated with diabetes (Ansary et al., 2020).

Anti-carcinogenic property

In addition to its cardiovascular and metabolic benefits, garlic exhibits anticancer properties. Epidemiological studies have suggested a link between garlic consumption and a reduced risk of certain cancers, particularly gastrointestinal cancers (Siyo et al., 2017). The anticancer effects are thought to arise from garlic's ability to induce apoptosis in cancer cells, inhibit tumor growth, and modulate immune responses (Patiño-Morales et al., 2021). Garlic's bioactive compounds, such as ajoene and other organosulfur compounds, have been identified as potential agents in cancer prevention and treatment (Zugaro et al., 2023).

Hepatoprotective effects

Garlic has demonstrated hepatoprotective effects, particularly in conditions such as non-alcoholic fatty liver disease (NAFLD). Clinical trials have shown that garlic supplementation can improve liver enzyme levels

and reduce hepatic steatosis, likely through the regulation of lipid metabolism and inflammation (Sangouni et al., 2020). The antioxidant properties of garlic also contribute to its protective effects against liver damage caused by various toxins and oxidative stress (Ansary et al., 2020).

Immunomodulatory effects

Garlic's immunomodulatory effects further enhance its therapeutic profile. Studies have indicated that garlic can shift cytokine patterns towards a Th1-type response, promoting a robust immune response against infections (Ghazanfari et al., 2000). This immunomodulatory action, combined with its antimicrobial properties, positions garlic as a valuable agent in the prevention and treatment of infectious diseases (Banerjee et al., 2003).

Other health benefits

Garlic and garlic extracts has also been shown to be useful as antibiotics effective against a wide range of spectrum, improve brain health due to its antioxidant and anti-inflammatory properties, enhance workout by improving oxygen utilization and endurance, improve digestion, detoxify the body, improve bone health due to the abundance of manganese and vitamin B6, improve skin health, offer liver protection, enhance weight reduction, and in combating common cold (Zugaro et al., 2023).

Preservative applications of garlic

The use of garlic (*Allium sativum*) as a food preservative has gained significant attention due to its potent antimicrobial and antioxidant properties. Garlic contains various organosulfur compounds, particularly allicin, which is known for its ability to inhibit the growth of a wide range of pathogens, including bacteria and fungi. This antimicrobial activity is crucial for extending the shelf life of food products, particularly perishable items such as meat and fish.

Garlic oil has been shown to effectively inhibit the growth of pathogens such as *Escherichia coli* and *Staphylococcus aureus*, making it a valuable addition to meat preservation strategies (Saad et al., 2019). The presence of allicin and other sulfur-containing compounds in garlic contributes to its ability to enhance the microbial safety of food products (Fujisawa et al., 2008). Studies indicate that garlic extracts can significantly reduce the microbial load in various food items, including minced meat and fish, thereby improving their shelf life and safety (Liaqat et al., 2019; Nejad et al., 2014). Furthermore, garlic's antioxidant properties help in delaying oxidative degradation, which is essential for maintaining the quality of preserved foods (Aydin & Kahyaoğlu, 2020; Bravi et al., 2016).

In addition to its antimicrobial effects, garlic has been recognized for its ability to improve the sensory qualities of food. For instance, the incorporation of garlic into food products can enhance flavor while simultaneously providing preservation benefits (Frank et al., 2014). The combination of garlic with other natural preservatives, such as ginger, has also been explored, demonstrating synergistic effects that further enhance the preservation of food items like tomato paste and fish (Olaniran & Adeniran, 2015). The effectiveness of garlic as a preservative is not limited to its direct antimicrobial action; it also plays a role in inhibiting biofilm formation, which is a common challenge in food preservation (Liaqat et al., 2019). This characteristic is particularly important in food processing environments where biofilms can harbor pathogens and contribute to food spoilage. Despite its advantages, the application of garlic as a food preservative faces challenges, such as its strong odor and the instability of some of its active compounds (Lee et al., 2014). However, ongoing research continues to explore methods to enhance the stability and acceptability of garlic extracts in food products, ensuring that its benefits can be fully realized in practical applications.

CONCLUSION

Garlic is a multifaceted medicinal plant with a wide array of health benefits, including cardiovascular protection, metabolic regulation, anticancer effects, hepatoprotection, and immune enhancement. Its diverse bioactive compounds contribute to its therapeutic efficacy, making it a valuable addition to both traditional and modern medicine. Garlic also serves as a promising natural food preservative due to its multifaceted antimicrobial and antioxidant properties. Its ability to enhance food safety and quality makes it an attractive alternative to synthetic preservatives, particularly in an era where consumers are increasingly seeking natural food preservation methods.

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