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The Role of Garlic Juice in Dyslipidemia: An Integrative Review

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ABSTRACT

Dyslipidaemia is a collective term for disorders of lipoprotein metabolism. It is clinically characterized by increased plasma levels of total cholesterol, LDL, TGs, variably accompanied by reduced levels of HDL cholesterol. The causes of dyslipidaemia are majorly combination of genetic predisposition and environmental contribution like diet, lifestyle, medical condition, or drug. Garlic's properties as an *Amapachaka* (detoxifier) and *Medohara* (fat-reducing agent) align with both Ayurvedic principles and modern lipid-lowering mechanisms. This review aims to provide a comprehensive mode of action of garlic with special reference to dyslipidaemia.

Key words – Dyslipidemia, Garlic juice, *Medoroga*

Introduction

Dyslipidemia, characterized by abnormal levels of lipids in the blood, is a significant risk factor for cardiovascular diseases (CVD), affecting approximately 39% of adults globally (World Health Organization, 2021).[i] Garlic (Allium sativum), a common culinary ingredient known for its pungent aroma, has been utilized in traditional and modern medicine for thousands of years. Ancient civilizations, including the Indians, Egyptians, Greeks, and Romans, recognized garlic's therapeutic properties and used it to treat a variety of ailments.

This paper explores the role of garlic juice in managing dyslipidemia, including its mechanisms of action and potential benefits. By examining the biochemical pathways influenced by garlic and reviewing clinical evidence, we aim to provide a comprehensive understanding of how garlic juice can be integrated into dyslipidemia management strategies.[2]

Understanding Dyslipidemia

Dyslipidemia involves elevated levels of total cholesterol, low-density lipoprotein cholesterol (LDL-C), triglycerides (TG), and low levels of high-density lipoprotein cholesterol (HDL-C). This condition promotes atherosclerosis, leading to cardiovascular events like heart attacks and strokes.[ii] (Chan et al., 2020). Management of dyslipidemia typically includes lifestyle modifications and pharmacotherapy. However, there is growing interest in complementary therapies, including the use of garlic juice.

Ayurvedic Perspective on Dyslipidemia

In *Ayurveda*, dyslipidemia can be correlated with "*Medo Dhatu Vruddhi*" or "*Medoroga*," conditions characterized by an imbalance of the *Meda* (fat) tissue in the body.[3] According to *Ayurvedic* principles, the primary cause of *Medoroga* is an imbalance in the *Kapha Dosha*, which governs the body's structure and lubrication.[4]

Dosha Imbalance:

***Kapha Dosha*:** Excessive accumulation of *Kapha* leads to the accumulation of fatty tissues and obstruction of the body's channels (*Srotas*). This imbalance results in increased cholesterol and triglycerides levels in the blood.

***Agni* (Digestive Fire):** Weak digestive fire or *Agni* leads to improper digestion and metabolism, causing the accumulation of *Ama* (toxins) and excess *Meda* (fat).

Pathogenesis: Dyslipidemia arises from an imbalance in diet and lifestyle, including the consumption of high-fat and sugary foods, lack of physical activity, and mental stress. These factors contribute to the imbalance of *Kapha Dosha* and the accumulation of *Meda Dhatu*. The imbalance in *Agni* leads to the production of *Ama*, which mixes with *Meda*, causing blockage of channels and resulting in conditions like dyslipidaemia.

Management Principles:

Diet (*Ahara*): A *Kapha*-pacifying diet that includes light, warm, and easily digestible foods is recommended. Foods that are bitter, pungent, and astringent help reduce *Kapha* and *Meda*.

Lifestyle (*Vihara*): Regular physical exercise, avoiding daytime sleep, and adopting stress-relieving practices are essential to manage *Kapha dosha*.

Herbal Remedies: Herbs with *Lekhana* (scraping) properties, such as garlic, are used to reduce excess *Meda* and manage dyslipidemia.

Garlic Juice and Dyslipidemia

Numerous studies have investigated the lipid-lowering effects of garlic. Garlic contains bioactive compounds like allicin, ajoene, and s-allyl cysteine, which contribute to its hypolipidemic properties. These compounds inhibit cholesterol synthesis, enhance lipid metabolism, and exert antioxidant effects.

Clinical Evidence:

1. **Jahan et al. (2015)** Highlighted garlic's efficacy in reducing total cholesterol, LDL-C, and TG levels while increasing HDL-C. This evidence supports garlic's role as a beneficial supplement in dyslipidemia management.[5]
2. **Limbu et al. (2019)** conducted a clinical trial showing significant reductions in total serum cholesterol, serum triglycerides, LDL-C, and VLDL cholesterol, along with an increase in HDL-C after garlic supplementation.[6]
3. **Aslani et al. (2016)** demonstrated that a combination of garlic and lemon juice significantly improved lipid profiles and reduced cardiovascular risk factors in hyperlipidemic patients.
4. **Ashraf et al. (2005)** evaluated the effects of garlic on dyslipidemia in patients with type 2 diabetes mellitus and found significant reductions in total cholesterol and LDL-C, with a moderate increase in HDL-C.[7]
5. **Alsufyani & Zawawi (2021)** indicated that garlic juice improved lipid profiles and renal function in rats fed a high-fat diet.[8]
6. **Seo et al. (2009)** found that both garlic and aged black garlic significantly improved lipid profiles and insulin sensitivity in an animal model of type 2 diabetes.
7. **Siddiqui et al. (2021)** showed that garlic had no adverse effects on renal function while significantly improving lipid profiles in diabetic dyslipidemic patients.
8. **Chen et al. (2019)** studied the preventive effects and mechanisms of garlic on dyslipidemia and gut microbiome dysbiosis, finding that garlic supplementation ameliorated dyslipidemia induced by a high-fat diet.
9. **Sil et al. (2021)** compared the hypolipidemic effects of garlic alone and in combination with atorvastatin or ezetimibe in an experimental model, showing significant lipid profile improvements.
10. **Ragavan et al. (2017)** evaluated garlic oil in a nano-emulsified form for its efficacy in high-fat diet-induced dyslipidemia in Wistar rats, demonstrating its effectiveness in reducing lipid levels.

Mechanisms of Action

Inhibition of Cholesterol Synthesis: Garlic inhibits the enzyme HMG-CoA reductase, which is crucial for cholesterol synthesis in the liver. HMG-CoA reductase is the rate-limiting enzyme in the mevalonate pathway of cholesterol biosynthesis. By inhibiting this enzyme, garlic reduces the production of cholesterol, thereby lowering overall cholesterol levels in the blood (Ashraf et al., 2005).

Enhanced Lipid Metabolism: Garlic increases the activity of lipoprotein lipase, an enzyme that breaks down triglycerides into free fatty acids. This enhanced activity facilitates the clearance of triglycerides from the bloodstream, reducing their levels and improving lipid profiles (Alsufyani & Zawawi, 2021).

Antioxidant Properties: The antioxidant properties of garlic protect against oxidative stress, which can oxidize LDL particles and make them more likely to form atherosclerotic plaques. Garlic's antioxidants, such as allicin and selenium, help maintain the integrity of lipid particles and reduce the risk of plaque formation (Chen et al., 2019).

Modulation of Gut Microbiome: Garlic contains prebiotic components, such as fructans, and antibacterial compounds that help maintain a healthy gut microbiome. A balanced gut microbiome is linked to improved lipid metabolism and reduced dyslipidemia. Garlic's modulation of the gut microbiome may enhance lipid metabolism and contribute to its lipid-lowering effects (Chen et al., 2019).

Integrative Approach to Using Garlic Juice

Dietary Inclusion:

Garlic can be incorporated into the diet in various forms, including raw garlic, garlic juice, or as part of meals. The bioavailability of active compounds is higher when garlic is consumed raw or in the form of juice. Combining garlic with other lipid-lowering agents, such as lemon juice, enhances its efficacy. This combination has been shown to provide synergistic benefits in improving lipid profiles and reducing cardiovascular risk factors (Aslani et al., 2016).

Supplementation:

supplements, such as garlic powder, garlic extract, and aged garlic extract, are available and have been studied for their lipid-lowering effects. These supplements provide a standardized dose of active compounds, ensuring consistent therapeutic benefits (Ashraf et al., 2022).

Lifestyle Modifications:

Alongside the dietary inclusion of garlic, lifestyle modifications such as regular physical activity, a balanced diet, and weight management are Garlic crucial for managing dyslipidemia. Garlic acts as an adjunct to these primary interventions, enhancing overall cardiovascular health.

Discussion

The findings from various studies underscore the potential of garlic juice as a complementary therapy in managing dyslipidemia. The bioactive compounds in garlic, such as allicin, ajoene, and s-allyl cysteine, have been consistently shown to exert lipid-lowering, antioxidant, and anti-inflammatory effects. This discussion integrates these findings, explores their implications, and suggests areas for future research.

Integrating Garlic Juice into Dyslipidemia Management

Efficacy and Mechanisms: The evidence presented indicates that garlic juice can significantly reduce levels of total cholesterol, LDL-C, and triglycerides while increasing HDL-C levels. The mechanisms by which garlic achieves these effects include the inhibition of HMG-CoA reductase, enhancement of lipid metabolism through increased lipoprotein lipase activity, and protection of lipids from oxidative damage. These multifaceted actions suggest that garlic can address dyslipidemia through several biological pathways simultaneously, offering a comprehensive approach to lipid management.

Clinical Implications: Incorporating garlic juice into the diet of individuals with dyslipidemia could provide a natural and cost-effective adjunct to conventional therapies. The studies reviewed highlight not only the lipid-lowering effects of garlic but also its safety profile, as evidenced by the lack of adverse renal effects in diabetic dyslipidemic patients (Siddiqui et al., 2021). This makes garlic a viable option for patients who may be at risk of side effects from standard lipid-lowering medications.

Synergistic Effects: Combining garlic with other natural or conventional agents, such as lemon juice or statins, has shown enhanced lipid-lowering effects. For instance, the combination of garlic and lemon juice significantly improved lipid profiles and reduced cardiovascular risk factors in hyperlipidemic patients (Aslani et al., 2016). Such synergistic combinations could potentially lower the required doses of conventional medications, thereby reducing their side effects.

Practical Considerations

Dosage and Formulation: The studies reviewed utilized various forms and dosages of garlic, ranging from raw garlic to garlic supplements. Standardizing the dosage and formulation of garlic for therapeutic use is essential to ensure consistent and reproducible benefits. Future research should focus on determining the optimal dosage and form of garlic (e.g., raw, juice, powder, extract) that provides the maximum therapeutic benefit with minimal side effects.

Long-term Effects: While short-term studies have demonstrated the efficacy of garlic in improving lipid profiles, the long-term effects of garlic supplementation need further investigation. Long-term studies are necessary to evaluate the sustained benefits and potential risks of prolonged garlic consumption in diverse populations.

Areas for Future Research

Mechanistic Studies: Further research is needed to elucidate the precise molecular mechanisms by which garlic exerts its lipid-lowering effects. Understanding these mechanisms could help in the development of targeted therapies that maximize the benefits of garlic.

Population Studies: Most studies have been conducted on specific populations, such as diabetic patients or animal models. Future research should include diverse population groups to ensure that the findings are generalizable across different demographics, including age, gender, ethnicity, and comorbid conditions.

Combinatorial Therapies: Exploring the effects of garlic in combination with other dietary or pharmacological agents could uncover new therapeutic strategies for managing dyslipidemia. Such studies should aim to identify combinations that offer synergistic benefits without increasing the risk of adverse effects.

Conclusion

Garlic juice plays a significant role in the management of dyslipidemia through its lipid-lowering, antioxidant, and anti-inflammatory properties. The integration of garlic into dietary and therapeutic regimens, supported by modern clinical evidence, offers a holistic approach to managing dyslipidemia. While garlic is not a replacement for conventional treatments, it serves as a valuable complement, contributing to the overall effectiveness of dyslipidemia management strategies.

References

1. Jahan F., Nanji K., & Qidwai W. (2015). Role of garlic in dyslipidemia: an evidence-based review. Scientific Journal of Animal Science.
2. Limbu A., Rauniar G., Sharma S., Panday D., Shah B., & Subedi M. (2019). Short-term Effect of Garlic Extract on Patients with Dyslipidemia. Nepal Medical College journal.
3. Vaidya Acharya Priyavat Sharma,Charak Samhita, Chaukhamba sanskrut pratisthan, Delhi, First edition 2013, Sutrasthana 21/9, page no 308.

   मेदोमांसातिवृद्धत्वाच्चलस्फिगुदरस्तनः। अयधोपचयोत्साहो नरोऽतिस्थूल उच्यते ॥
4. Vd. Anatram Sharma, Sushrut Samhita, Chaukhamba Surbharati Prakashan, Varanasi, Sutrasthan 15/37, Page - 127

   रसनिमित्तमेव स्थौल्यं काय च । सु.सू. १५/३७
5. Aslani N., Entezari M., Askari G., Maghsoudi Z., & Maracy M. (2016). Effect of Garlic and Lemon Juice Mixture on Lipid Profile and Some Cardiovascular Risk Factors in People 30-60 Years Old with Moderate Hyperlipidemia: A Randomized Clinical Trial. International Journal of Preventive Medicine.
6. Ashraf R., Aamir K., Shaikh A., & Ahmed T. (2005). Effects of garlic on dyslipidemia in patients with type 2 diabetes mellitus. Journal of Ayub Medical College Abbottabad.
7. Alsufyani H., & Zawawi B. M. H. (2021). Protective effect of garlic juice on renal function and lipid profile in rats fed with high-fat diet. Saudi Journal for Health Sciences.
8. Seo Y.-J., Gweon O.-C., Im J., Lee Y. M., Kang M.-J., & Kim J.-I. (2009). Effect of Garlic and Aged Black Garlic on Hyperglycemia and Dyslipidemia in Animal Model of Type 2 Diabetes Mellitus. Journal of Food Science and Nutrition.
9. Siddiqui N. A., Ishaque I., Rahat Y., Akhtar N., Tehreem U., Javed R., & Ali R. (2021). Adverse Effects of HMG CoA Reductase Inhibitor and Garlic on Renal Function in Patients with Diabetic Dyslipidemia. Annals of Abbasi Shaheed Hospital and Karachi Medical & Dental College.
10. Chen K., Xie K., Liu Z.-Y., Nakasone Y., Sakao K., Hossain A., & Hou D. (2019). Preventive Effects and Mechanisms of Garlic on Dyslipidemia and Gut Microbiome Dysbiosis. Nutrients.
11. Sil S., Roy U. K., Biswas S., Mandal P., & Pal K. (2021). A Study to Compare Hypolipidemic Effects of Allium Sativum (Garlic) Alone and in Combination with Atorvastatin or Ezetimibe in Experimental Model. Serbian Journal of Experimental and Clinical Research.
12. Ragavan G., Muralidaran Y., Sridharan B., Ganesh R. N., & Viswanathan P. (2017). Evaluation of garlic oil in nano-emulsified form: Optimization and its efficacy in high-fat diet-induced dyslipidemia in Wistar rats. Food and Chemical Toxicology.

13. World Health Organization. (2021). Cardiovascular diseases (CVDs) fact sheet. Retrieved from https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds).