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Policy Brief

Public Health Policy: Garlic Powder as an Effective Supplement in the Management of Metabolic Syndrome and Fatty Liver

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Abstract

Metabolic Syndrome (MetS) is a serious public health problem that significantly increases the risk of cardiovascular disease (CVD) and type 2 diabetes. This study aimed to determine the effectiveness of garlic powder supplementation in improving the components of MetS, fatty liver index, bowel function, and appetite control in affected patients. This study was a 12-week randomized, controlled, double-blind clinical trial involving 90 patients with MetS. Patients were divided into two groups: the intervention group receiving 1600 mg of garlic powder daily (in the form of four 400 mg tablets) and the control group receiving a placebo. After 12 weeks, the garlic powder group showed significant reductions in waist circumference, systolic and diastolic blood pressure, triglycerides, total cholesterol, and Fatty Liver Index (FLI) ($P < 0.001$). A significant improvement was also observed in HDL levels, appetite control, and bowel function. Changes in Body Mass Index (BMI) and fasting blood sugar were not statistically significant. Garlic powder supplementation can be used as a complementary and cost-effective nutritional strategy, alongside standard treatments, for managing risk factors associated with Metabolic Syndrome.

Keywords: Metabolic Syndrome, Garlic Powder Supplementation, Fatty Liver Index, Cardiovascular Risk Factors, Nutritional Intervention

1. Background

Metabolic Syndrome, as a multi-factorial condition with increasing global prevalence, places a heavy economic and healthcare burden on health systems.[1] The diagnosis of this syndrome requires the presence of at least three out of five criteria defined by NCEP–ATPIII: central obesity, hypertriglyceridemia, low HDL cholesterol, hypertension, and elevated fasting glucose.[1] Its prevalence in developed and developing countries, including Iran, is reported to be over 30% of the adult population, reaching up to 35% in some studies.[2]

The pathophysiology of this syndrome is complex, associated with insulin resistance, chronic low-grade inflammation, and oxidative stress. As pharmacological treatments may be associated with side effects, attention has been increasingly drawn to natural nutritional interventions such as garlic. Garlic (*Allium sativum*) contains sulfur compounds, including allicin, which, as a potent antioxidant, possesses anti-inflammatory, lipid-lowering, and hypotensive properties.

Although numerous studies have reported the positive effects of garlic on components of MetS,[3,4] there have been discrepancies regarding the effective dosage, formulation, and duration of treatment. Therefore, a clinical trial with a precise and controlled design was necessary to confirm the simultaneous effects of garlic on a wide range of metabolic indices, particularly the fatty liver index and appetite control.

2. Methods

This research project was a randomized, double-blind clinical trial conducted at Shahid Arefian Hospital in Urmia, with approval from the Ethics Committee.

- Study Population: 90 adult patients with Metabolic Syndrome, based on NCEP–ATPIII criteria, were selected and randomly assigned to two groups of 45 people.
- Intervention: The intervention group received 1600 mg of garlic powder daily, and the control group received a starch placebo.
- Consumption Protocol: The prescribed dose was divided into 4 tablets, and patients were instructed to consume the tablets one hour before the main meals of lunch and dinner. This timing was set to maximize the

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effects on appetite control.

- Assessments: Key parameters including waist circumference (WC), blood pressure, lipid profile, fasting blood glucose, and Fatty Liver Index (FLI) were measured at baseline and after 12 weeks. Additionally, standard questionnaires (VAS) were used to assess appetite, and the Bristol Stool Scale (BSS) was used for bowel function.

3. Results

Statistical analysis results, after adjusting for confounding variables, showed:

- Physical Indices: Mean waist circumference significantly decreased in the intervention group ($P = 0.001$). However, there was no statistically significant difference between the two groups for weight and BMI.
- Blood Pressure: Both systolic and diastolic blood pressure showed significant improvement in the garlic-consuming group ($P < 0.001$).
- Lipid Profile: Total cholesterol was accompanied by a significant reduction ($P = 0.02$), and more importantly, a significant increase was reported in HDL cholesterol levels, which is a protective factor ($P < 0.001$).
- Fatty Liver and Appetite: The FLI and GGT enzyme significantly improved ($P < 0.001$). Appetite control also clearly improved on the VAS questionnaire ($P < 0.001$).
- Non-Significant Results: Changes in BMI and fasting blood glucose were not statistically significant between the two groups

4. Discussion and Conclusion

The results of this study strongly demonstrated that 12 weeks of supplementation with 1600 mg of garlic powder is an effective tool for the multi-faceted management of Metabolic Syndrome. The results regarding the reduction of waist circumference and blood lipids are consistent with the studies by Choudhary[5] and Ashraf,[3] which confirmed the effects of garlic on lowering triglycerides.

Probable Mechanisms of Action:

1. Anti-Dyslipidemia Effects: The reduction in triglycerides and total cholesterol is mainly attributed to garlic's organosulfur compounds, which act by inhibiting cholesterol synthesis in the liver (by inhibiting the HMG−CoA reductase enzyme) and increasing fat catabolism.[6] These findings are in agreement with previous research.[3,4]
2. Blood Pressure Control: Garlic is thought to reduce blood pressure by increasing the bioactivity of nitric oxide (NO), which causes vasodilation and reduced peripheral vascular resistance.[5]
3. Fatty Liver Improvement: The reduction in hepatic triglycerides, the improvement in the FLI, and the decrease in the GGT enzyme all indicate the protective effects of garlic against Non-Alcoholic Fatty Liver Disease (NAFLD) steatosis.
4. Bowel Function and Appetite: The improvement in stool consistency suggests the potential prebiotic properties of garlic, which enhance gut microbiota health. The change in appetite-regulating hormones (such as Ghrelin or GLP−1) influenced by garlic or improved microbiota may be the mechanism for the significant reduction in appetite.

5. Final Conclusion and Policy Recommendations

Given the high efficacy, low cost, and safety of garlic powder supplementation, this approach can be considered a public health strategy for managing Metabolic Syndrome. The following recommendations are proposed for implementation:

- Promotion of Use: Health centers can recommend the consumption of 1600 mg of garlic powder as an adjunct therapy for patients with hypertension and dyslipidemia.
- Education on Timing: Emphasis should be placed on consuming the supplement one hour before lunch and dinner to maximize its effects on appetite control and weight management.
- Prioritization for Fatty Liver: Due to the improvement in the FLI, this supplement is specifically recommended for the prevention or management of NAFLD progression in metabolic patients.

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Author Contributions

Authors contributed equally to this work.

Conflict of Interest Disclosures

All authors declared that they have no conflict of interest.

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