Effects of garlic on serum lipids and blood glucose of type 2 diabetic patients

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AIM: To evaluate the effects of Garsin (garlic extract from Goldarou Company, Iran), on serum lipids and blood glucose in patients with type 2 diabetes mellitus.
METHODOLOGY: A total of 45 hyperlipidemic type 2 diabetes cases were selected randomly from diabetics attending Yazd Diabetes Research Center. They underwent treatment with one Garsin tablet (300 mg of effective extract of garlic) three times a day for 4 weeks, and their serum lipids and blood glucose levels were measured both at the beginning and end of the study.
RESULTS: Garsin significantly reduced total serum cholesterol by 18.6 mg/dl and serum LDL by 15.7 mg/dl (P = 0.004, P = 0.001 respectively). The effects of Garsin tablet in lowering LDL (P = 0.015) and increasing HDL (P = 0.056) was more obvious in women than in men.
CONCLUSIONS: Garsin is effective in lowering blood glucose and lipids and may be useful for treatment of diabetic and hyperlipidemic patients.

KEY WORDS: Garlic, lipids, type 2 diabetes.

Introduction

Diabetes mellitus is one of the most common metabolic disorders in the world that results from impaired insulin secretion, resistance to insulin and hepatic glucose overproduction.[1] Atherosclerosis is one of the chronic complications of diabetes, affecting many organs and contributing toward the morbidity and mortality of the disease.[2] One of the risk factors causing atherosclerosis and progress to diabetic complications, especially cardiovascular problems, is hyperlipidemia.[3] Standard anti-hyperlipidemic agents are linked to side effects which contribute to patient's non-compliance. Therefore, newer options such as herbal drugs are being investigated. Garlic has been used since ancient times because of its antimicrobial and lipid-lowering effects and currently its benefits have been observed in many studies. The aim of this study was to evaluate effects of garlic on serum glucose and lipids in patients with type 2 diabetes mellitus.

Methodology

A total of 45 hyperlipidemic type 2 diabetic patients were selected randomly from diabetics attending Yazd Diabetes Research Center. They underwent treatment with one Garsin tablet (garlic extract from Goldarou Company, Iran) three times a day for 4 weeks. Each tablet contains 300 mg of effective extract of garlic. Physical activity and dietary and drug regimen of patients were unchanged 1 month before and during the study. Fasting blood sugar (FBS), 2 h postprandial glucose (PP), total cholesterol, LDL, HDL and triglyceride levels were measured at Yazd Diabetes Research Center laboratory. Statistical analysis was done by SPSS Win software using paired T test. The ethical committee of Research Deputy of Shahid Sadoughi University of Medical Sciences approved our study.

Results

Patients had FBS of 126-300 mg/dl and were under treatment with dietary regimens and oral anti-diabetic agents. They were aged between 30 and 65 years, and their serum triglyceride and total cholesterol was between 200 and 400 mg/dl. Five patients (11%) withdrew from the study because of gastrointestinal complications, skin rash and vertigo. Twenty-four subjects (60%) were male

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and 16 (40%) were female. Twenty-one patients (52.2%) were above 50 years of age and 19 patients (47.5%) were of age less than or equal to 50 years.

This study did not show any significant differences between fasting blood glucose and 2 h PP glucose levels before and after Garsin consumption [Table 1]. Total serum cholesterol level was 207.7 ± 42.2 mg / dl and 189.1 ± 35.6 mg / dl before and after Garsin intake respectively (P = 0.004) [Table 2]. Mean serum LDL cholesterol level also decreased by 15.7 ± 2.7 mg / dl, which was significant (P = 0.001). HDL cholesterol level increased by 1.5 ± 0.8 mg / dl after garlic use but was not significant (P = 0.284). Mean serum triglyceride level increased by 4.3 ± 0.61 mg / dl after garlic consumption but was not significant (P = 0.672) [Table 2].

Discussion

Our study showed significant decrease of total serum cholesterol (by 9%) and LDL cholesterol (by 14%) (P = 0.004 and 0.001 respectively). Moreover, serum HDL cholesterol and triglyceride levels decreased after Garsin consumption, but these changes were not significant (P = 0.284 and 0.672 respectively). Further, there were no significant changes in fasting and 2 h PP blood glucose levels (P = 0.06 and 0.35 respectively). In our study, effects of garlic with respect to gender revealed significant decrease in LDL cholesterol levels in men (P = 0.030), whereas total serum cholesterol decrease in women was of borderline significance (P = 0.052).

Many investigators have studied garlic for its effect on lowering blood glucose and lipids, and diverse results have been reported. Different garlic products (oil, powder or tablet) have been used and various garlic doses also have been tested. Usually a daily dose of 900 mg of effective garlic extract has been used in studies. Mechanism of action in lowering serum lipids includes delayed lipid absorption from the GI tract and diminished LDL cholesterol synthesis by liver.[4]

In a study performed in 1993 by Jain *et al.* on 42 patients with total cholesterol ≥220 mg / dl, after 12 weeks treatment by garlic, total serum cholesterol and LDL levels decreased by 5.7% and 11% respectively, but there wasn't any obvious change in serum HDL cholesterol and triglyceride.[5] In a study done by Bordia, 62 diabetic patients with cardiovascular disease and high serum cholesterol levels underwent treatment with garlic for 10 months; the results showed total serum cholesterol, triglyceride and LDL cholesterol decreased significantly and HDL cholesterol increased significantly,[6] while in our study there was no increase in HDL level. In the study performed by Mansell *et al.*, 60 patients with type 2 diabetes mellitus received 900 mg garlic tablet daily, and their total serum cholesterol and LDL cholesterol decreased after 6 weeks and HDL cholesterol increased after 12 weeks, although serum triglyceride level remained unchanged.[7] In another study done by Jain and Mansell, garlic tablet had no effect on lowering fasting blood glucose.[5,7] In U.K., Xiao-Huzhang and colleagues reported that the effect of garlic oil in increasing serum HDL level was better in women than in men, and garlic oil increased blood glucose in women but decreased it in men.[8]

Conclusion

Based on the results of our study, we conclude that as this drug has minimal complications and useful effects on hyperlipidemia, it can be used as a supplementary

Table 1: Mean fasting blood glucose and 2 h postprandial glucose levels before and after garlic consumption in type 2 diabetic patients (N = 40)

Variables	Before Garsin		After Garsin		*P*-value
	Mean	SD	Mean	SD	
Fasting blood glucose (mg/dl)	161.5	30.5	154.5	32.2	0.06
2-hour post prandial glucose (mg/dl)	254.5	62.5	246.5	58.3	0.35

Table 2: Mean serum lipid levels before and after using garlic in type 2 diabetic patients (N = 40)

Variables	Before Garsin		After Garsin		*P*-value
	Mean	SD	Mean	SD	
Triglyceride (mg/dl)	252.9	90.3	257.1	32.2	0.672
Total cholesterol (mg/dl)	207.7	42.2	189.1	35.6	0.004
LDL-cholesterol (mg/dl/)	111.3	41.1	95.6	37.5	0.001
HDL-cholesterol (mg/dl)	39.4	9.9	40.9	9.5	0.284

LDL - Low-density lipoprotein, HDL - High-density lipoprotein

drug for treatment of patients with diabetes and hyperlipidemia. As mentioned above, there was no significant correlation between garlic consumption and blood glucose levels in our study and further studies are needed for determination of this relationship.

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