



Published by DiscoverSys

The effect of garlic and cumin on blood pressure and glycosylated hemoglobin in patients with type 2 diabetes



CrossMark

Ali Mansouri,¹ Aziz Shahraki Vahed,¹ Hossein Shahdadi,^{1*} Fatemeh Dashtban,² Azizollah Arbabisarjou³

ABSTRACT

Introduction: Type 2 diabetes is one of the most common chronic diseases. High blood pressure is seen in 70% of diabetic patients. Garlic is useful for patients with diabetes due to its active compounds. Cumin is one of the medicinal herbs that is being studied recently with highlighted role in treating diabetes. The aim of this study was to evaluate the effect of cumin and garlic on blood pressure and glycosylated hemoglobin in patients with type 2 diabetes.

Methods: A clinical trial including 75 patients with type 2 diabetes who referred to Imam Khomeini Diabetes Clinic of Zabol were selected according to entry criteria and randomly divided into 3 groups of 25 individuals. First, glycosylated hemoglobin and blood pressure of the patients were measured. Then, the patients were divided into three groups. The first group received 300 mg of garlic powder three times a day, the second group received 100 mg cumin extract twice a day, and the control group received placebo for two months. Glycosylated

hemoglobin and blood pressure of the patients were re-measured after the intervention. Data were analyzed using paired T-test and ANOVA in SPSS software version 22.

Results: Based on the findings in the garlic consumer group and the cumin group, the difference was significant in mean systolic and diastolic blood pressure before and after the intervention ($P < 0.0001$). In the garlic consumer group, the mean of HbA1c before and after the intervention was not statistically significant ($P = 0.11$). However, the mean difference was significant in the cumin group ($P = 0.001$).

Conclusion: Cumin was observed to improve HbA1c levels and blood pressure. Taking 3 servings of 300 mg garlic capsules improved blood pressure in diabetic patients. Supplementation of garlic and cumin can be useful in controlling complications and treating diabetes in the future.

Keywords: Type 2 diabetes, Cumin, Garlic, Blood pressure, Glycosylated hemoglobin

Cite This Article: Mansouri, A., Vahed, A.S., Shahdadi, H., Dashtban, F., Arbabisarjou, A. 2018. The effect of garlic and cumin on blood pressure and glycosylated hemoglobin in patients with type 2 diabetes. *Bali Medical Journal* 7(1): 156-160. DOI:10.15562/bmj.v7i1.849

¹Msc in Nursing, Nursing and Midwifery School, Zabol University of Medical Sciences, Zabol, Iran.

²Student, Student Research Committee, Nursing and Midwifery School, Zabol University of Medical Sciences, Zabol, Iran.

³Community Nursing Research Center, Zahedan University of Medical Sciences, Zahedan, Iran.

*Correspondence to: Hossein Shahdadi, School of Nursing and Midwifery, Zabol University of Medical Sciences, Zabol, Iran. zb5950@gmail.com

Received: 2017-09-13

Accepted: 2017-10-27

Published: 2017-10-28

INTRODUCTION

Diabetes Mellitus is one of the most common metabolic disturbances associated with increased blood sugar, metabolism of carbohydrates, lipids, proteins, and relative or absolute insulin depletion.¹ The prevalence and incidence of this disease are rising continuously, which implies a global epidemic.² Type 2 diabetes (T2DM) involve 95-90% of subjects. According to the World Health Organization (WHO) estimates, the number of affected people will increase from 171 million in 2000 to 366 million in 2030. The organization also predicts that the number of people with diabetes in Iran will reach 210,300 (7.5%) in 2000 to 5215,000 (6.8%) in 2025.³

Complications of diabetes affect almost all parts of the human body.⁴ Vascular complications of diabetes include neuropathy, nephropathy and retinopathy, and macrovascular disease, which is one of the major causes of mortality in patients.⁵ Hypertension is seen in 70% of diabetic patients. The risk of developing diabetes is two times higher in people with high blood pressure.⁴

Hypertension is a risk factor for cardiovascular disease, and its control has great importance. High blood pressure and diabetes mellitus are two main risk factors for atherosclerosis, which is responsible for early inability and high mortality in diabetic patients. Of the 1,500 diabetic patients examined by Danish researchers, 51% of patients with type 1 diabetes and 80% of type 2 diabetic patients had hypertension above 90-140 mmHg.⁶

Hemoglobin A1c is a test that is expressed in percentages and over the past, two to three months shows how much percentage of hemoglobin has been combined with blood sugar. This compound persists as long as the red blood cell is still alive. Acceptable hemoglobin A1c amount is less than eight and preferably less than seven percent. Several studies have shown that the presence of hemoglobin A1c below 7% not only prevents the onset of complications of diabetes, but even improves complications, and prevents them from progression.⁷

The first step in the treatment of diabetes is to control blood sugar levels. This is possible through diet, physical activity, use of hypoglycemic agents and insulin therapy.⁸ Chemical drugs used to treat diabetes have adverse side effects. Insulin is one of these medications that can lead to complications such as lipohypertrophy of lipoatrophy. Patients' concerns about the complications of chemical drugs led to the patient's failure to adhere to the drugs regimen and misuse of these drugs, and thus impairment of the precise control of the disease.⁹ Before the discovery of insulin as well as common antidiabetic drugs, diabetic patients were treated with medicinal herbs and traditional treatments. Over the past 10 to 20 years, laboratory and clinical studies have been carried out on plants used to treat diabetes, some of which have significant effects on the reduction of blood sugar and blood pressure.¹⁰

Therefore, considering that the properties of sugar and blood pressure reduction by the use of some herbal drugs have been proven, it is possible to reduce the amount of blood sugar and hypertension in diabetic patients with diet, healthy lifestyle, regular exercise and the use of herbal medications.

Nursing is one of the first professionals to use complementary and alternative drug. The complementary drug is used as an intervention for many nursing diagnoses and is therefore named in the classification of nursing interventions.¹¹ Treatment by herbal drugs is one of the main components of complementary drug.¹² One of the herbs that will probably help in the treatment of diabetes is cumin. Cumin is called cumin seed in English. In traditional drug, cumin is used as an anti-obesity, anticonvulsant, antiepileptic, diuretic, and stomach booster and has recently been considered as an anti-diabetes drug in some studies.¹³ There have also recently been reports on the anti-diabetic properties of garlic, and it has been shown that Acysteine / S-Allylcysteine (SAC) in garlic, such as insulin and Glibenclamide, has been shown to reduce blood sugar levels. Studies have also shown that garlic oil and its compounds such as diallyl trisulfide can improve blood sugar levels in diabetic rats.¹⁴ Since there are no specific drugs interactions associated with the use of cumin or garlic in combination with hypoglycemic agents and blood pressure,¹⁵ hence the present study was conducted to investigate the effect of garlic and cumin on blood pressure and glycosylated hemoglobin in patients with type 2 diabetes.

MATERIALS AND METHODS

This study was carried out in the form of clinical trial. The statistical population included all type

II diabetic patients referred to the diabetes clinic of Imam Khomeini Hospital in Zabol. The total of 75 patients with type 2 diabetes who entered the study were randomly divided into three groups with 25 subjects in each group, including two intervention groups and one control group. The inclusion criteria for entering this study include: type 2 diabetes of at least 6 months of diagnosis, hypertension above 140 / 90 mmHg, ability to speak, lack of psychological diseases, non-insulin therapy, non-pregnancy, non-breastfeeding, lack of use of extracts of cumin and garlic, having a single drug schedule in terms of type of used drugs, not using tobacco or alcohol, and HbA1c higher than 8%.

Initially, after explaining the goals of the treatment to patients and obtaining written informed consent, a general information questionnaire was obtained and completed through interviews with each of the patient, including demographic information and disease information (duration of illness, signs associated with illness, source of information, consumed drugs). Then, HbA1c and systolic and diastolic blood pressure were measured in all three groups. Patients were told to rest at least half an hour before measuring blood pressure and not to drink tea. During the measurement of the patient's blood pressure, they were placed in a sitting position, and the patient's hand was maintained at the same level with his/her heart by the examiner's hand. At the first visit, blood pressure was recorded from both arms. In the case of pressure difference, the higher blood pressure was considered as the blood pressure of the patient. To measure HbA1c, a blood sample was taken and sent to the lab. The intervention group 1 received one capsule of 100 mg cumin, consumed after lunch and dinner. The intervention group 2 got 300 mg capsules of garlic powder to consume after breakfast, lunch, and dinner meals. The control group consumed the placebo with the same appearance.

All patients received training on diet, activity level, and drug regimen. The principles of treatment were emphasized daily through text messages to patients. Patients were also examined in terms of drug side effects and compliance with diet, drug, and activity levels, and were excluded from the research if they did not follow any of the above items. Two months after the start of the study, blood pressure and HbA1c were again measured in all three groups. Data were analyzed using paired T-test and ANOVA in SPSS software version 22. Also, ($p < 0.05$) was considered significant.

RESULTS

The mean age in garlic group was 52.8 ± 4.35 , in cumin group was 53.08 ± 5.79 and 52.96 ± 5.25 in control group. In terms of sex, the garlic consumer group consisted of 6 male (24%) and 19 female (76%), cumin group of 8 male (32%) and 17 female (68%) and control group including 20 Male (26.7%) and 55 were female (73.3%). There was also no complication after the use of garlic and cumin in all participants.

Based on the findings in the garlic consumer group and the cumin consumer group, the difference in mean systolic and diastolic blood pressure was significant ($P < 0.0001$) before and after the intervention. This means that the consumption of garlic and cumin improves blood pressure. Furthermore, this difference was not significant in the control group ($P > 0.05$). In the garlic consumer group, the mean of HbA1c before and after intervention was not statistically significant ($P = 0.11$). However, this mean difference was significant in the cumin group ($P = 0.001$). Also, the control

group did not have a significant difference in this regard ($P = 0.54$). (Table 1).

According to the results of Table 2, the mean systolic blood pressure, diastolic blood pressure and HbA1c were not significantly different ($P > 0.05$) in the three groups of garlic, cumin consumers, and control group before intervention. (Table 2)

Table 3 shows the mean of blood pressure and HbA1c in all three groups after intervention. The mean systolic pressure in the cumin consumer group was lower than that of the garlic and control group and statistically significant ($P < 0.0001$). On the other hand, the mean diastolic blood pressure after intervention in the garlic consumer group was lower than the other two groups and showed a statistically significant difference ($P < 0.0001$). Mean Hba1c was also lower in the cumin group than in the other two groups, and this difference was statistically significant ($p = 0.04$). (Table 3).

Table 1 Comparison of mean blood pressure and HbA1c before and after intervention in all three groups

Variable	Before intervention		After intervention		P-value
		Mean+standard deviation		Mean+standard deviation	
Garlic group	Systolic BP	14.78 ±147.14		14.14 ±132.36	0.0001>
	Dyastolic BP	11.33±96.83		10.11±79.67	0.0001>
	HbA1c	2.41±11.13		2.83±10.48	0.11
Cumin group	Systolic BP	12.14 ±144.11		11.81 ±130.17	0.0001>
	Dyastolic BP	9.14±95.61		8.84±82.13	0.0001>
	HbA1c	3.17±12.17		2.13±9.41	0.001
Control group	Systolic BP	15.42 ±146.82		14.13 ±147.18	0.73
	Dyastolic BP	9.73±94.11		7.42±93.14	0.67
	HbA1c	2.01±12.01		2.12±12.11	0.54

Table 2 Comparison of mean blood pressure and Hba1c before the intervention in three groups

Group	Mean+standard deviation	Mean+standard deviation	Mean+standard deviation		
Variable	Consumer group of Garlic	Consumer group of Cumin	Control Group	Statistical test	P-value
Systolic BP	14.78±147.14	12.14±144.11	15.42±146.82	ANOVA	0.23
Diastolic BP	11.33±96.83	9.14±95.61	9.73±94.11	ANOVA	0.13
HbA1c	2.41±11.13	3.17±12.17	2.01±12.01	ANOVA	0.9

Table 3 Comparison of mean blood pressure and Hba1c after intervention in three groups

Group	Mean+standard deviation	Mean+standard deviation	Mean+standard deviation	Statistical test	
Variable	Consumer group of Garlic	Consumer group of Cumin	Control Group	ANOVA	P-value
Systolic BP	14.14±132.36	11.81±130.17	14.13 ±147.18	ANOVA	0.0001>
Diastolic BP	10.11±79.67	8.84±82.13	9.73±94.11	ANOVA	0.0001>
HbA1c	2.83±10.48	2.13±9.41	2.12±12.11		0.04

DISCUSSION AND CONCLUSION

The results of this study showed that there is a significant difference between the mean HbA1c in the three groups of garlic, cumin and control groups. Also, the difference in mean systolic and diastolic blood pressure showed a significant difference in the three groups of garlic, cumin, and control. In this regard, studies similar to this study have been carried out with similar or different result. Parastooyi et al. conducted a study in 50 subjects with type 2 diabetes (T2DM), and hyperlipidemia participated in the study to evaluate the effect of garlic pills on blood sugar, plasma lipids and blood pressure in 1384. The results showed that the mean HbA1c glycosylated hemoglobin in the garlic recipient group did not differ significantly,¹⁶ which was consistent with the results of the present study. In another human study by Kumar et al. with the participation of 60 diabetic patients, the intervention group received metformin tablets, 2 tablets of 250 milligrams of garlic for 12 weeks. At the end of the study, no significant reduction was observed in the comparison of the HbA1c levels in the intervention group with the control group,¹⁷ the results were consistent with the results of the present study. Khedmian et al.(2015) conducted a study in 50 patients with type 2 diabetes in order to investigate the effect of garlic pills on blood sugar and lipid profiles. The results showed that the mean HbA1c index in the garlic recipient group was significantly reduced compared to the control group.³ The results of this study were not consistent with the findings of this study.

Ebadi et al.(2007) studied In 60 subjects with type 2 diabetes (T2DM) in order to evaluate the effect of garlic pills on fasting blood sugar in these patients (FBS). In this study, the intervention group received 3 doses of twice daily garlic pills with 400 mg doses for three months. The results showed a significant decrease in glycosylated hemoglobin in the intervention group compared to the control group.⁵ The results of this study were not consistent with the results of this study. One of the reasons for the difference between these two studies can be due to the difference in the duration of the intervention because in the study of Ebadi, the duration of the intervention was three months and in the present study, the duration of the intervention was two months.

The results of this study in relation to the systolic blood pressure index in the three groups of garlic recipients, cumin and control recipients showed that the mean systolic and diastolic blood pressure index were not significantly different in the control group before and after the intervention, but the mean of this indicator in both groups of garlic and

cumin recipients (compared to control group) was significantly decreased.

The results of Parastouei et al. (2015) showed that the mean systolic blood pressure decreased significantly in the garlic recipient group, which was consistent with the results of the study, but no significant changes were observed in diastolic blood pressure.¹⁶ The reason for this difference can be attributed to the duration of the intervention. Because in the study of Parastouei et al.(2015), the duration of the intervention was 6 weeks and in the present study, the duration of the intervention was two months. Afkhami Ardakani, Kamali and Ardakani (2008) conducted a study with participation of 45 patients with type 2 diabetes, in order to investigate the effect of garlic on blood pressure. These patients were treated with Garsin tablet, 3 times per day (Gol-Daru Company) for four weeks. The results showed a significant decrease in diastolic and systolic blood pressure in the intervention group compared to the control group,¹⁸ which is consistent with the results of the present study.

It was recently reported on the anti-diabetic properties of garlic, and it has been shown that Acysteine/ S-Allylcysteine (SAC) in garlic, such as insulin and glibenclamide, reduces blood glucose levels. Studies have also shown that garlic oil and its compounds such as Di-Alil three phosphate can improve glucose levels in diabetic rats.¹⁴ Which was not consistent with the results of the present study, and follow it up will be depended on further research in this field. In traditional drug, cumin is also used as an anti-obesity, anticonvulsant, antiepileptic, diarrhea and stomach booster, and has recently been considered as an anti-diabetic drug in some studies.¹³ In the present study, cumin positive effects were observed of on the improvement of HbA1c levels and blood pressure. Also, taking 3 servings of 300 mg capsules of garlic improved blood pressure in diabetic patients. Accordingly, it can be said that supplementation of garlic and cumin can be useful in controlling complications and treating diabetes.

REFERENCES

1. Pahlavani N, Sadeghi O, Rasad H, Azizi Soleiman F. Relation of inflammation and oxidative stress with blood glucose, lipids and BMI, fat mass and body weight in people with type 2 diabetes. *Journal of Zabol Diabetic Nursing*, 2014; 2 (2): 42-51.
2. Ebrahimi Fakhari H, Hekmat Pour D, Haji Nar Ali S. Comparison of the effect of aqueous extract of walnut leaves, mountain rings and thorns with glibenclamide on glucose in diabetic rats. *Journal of Complementary Medicine*, 2011; 1 (4): 23-33.
3. Khademian R, Mozafari H, Esteghamati A, Pasha Meisami A. Study of the effect of taking blood glucose tablets and lipid profile in patients with type 2 diabetes

- is an unannounced randomized clinical trial. *Journal of Shaheed Sadoughi University of Medical Sciences Yazd*, 2016; 22(7): 621-630.
4. Mohammadi M, Rashidi M, Afkhami Ardakani M. Risk Factors and Treatment for Type 2 Diabetes. *Journal of Shaheed Sadoughi University of Medical Sciences Yazd*, 2011; 9 (2): 22-29.
 5. Ebadi A, Rahimi Lenji A, Taghadosi M, Khorshidi A, Akbari H. The effect of garlic pills on blood glucose in type 2 diabetic patients. *Feyz Scientific-Research Quarterly*, 2007; 11 (1): 20-25.
 6. Sardar H, Abas Zadeh L, Hosseinian A, Iran Parvar M, Khod Morad Zadeh Z. Survey of blood pressure control status in patients with type 2 diabetes referred to the diabetes clinic of Boali hospital in Ardebil. *Journal of Ardabil University of Medical Sciences & Health Services*, 2003; 3 (9): 28-32.
 7. Mofid A, Ali Naghi A, Zandieh S, Mofid R. Comprehensive guide to diagnose, monitor and treat diabetes. Tehran, publication: Osaneh, 2011.
 8. Malekaneh M, Sadeghi Zadeh Bafandeh S, Hoji Pour F, Naseri M. The effect of Cambodia tea tea and blood lipid profiles in rats. *Journal of Birjand University of Medical Sciences*, 2015; 22 (2): 169-175.
 9. Ghanbari Rad M. Take a look at the medicinal herbs. *Journal of Laboratory Diagnosis*, 2016; 25 (2): 28-32.
 10. Fallah Hosseini. Clinical trial on the effect of marijkat marijuana seed extract on blood lipids in type 2 diabetic patients with high blood lipids. *Journal of Lipid diabetes*, 2004; 3 (2): 201-206.
 11. Zagheri M, Rasouli M, Tabatabaei A, Golmakani A, Mortazavi H. The application of complementary medicine in nursing with emphasis on therapeutic touch. *Journal of North Khorasan University of Medical Sciences*. 2014; 6 (1): 207-213.
 12. Naderi M, Foroutan L, Kouh Khil A. The application of traditional medical methods in the treatment of diabetes. *Journal of Zabol Diabetic Nursing*, 2013; 1 (1): 53-59.
 13. Mohiti Ardakani J, Akbarian Z, Nazarian A. Effect of Cumin Essence on Blood Glucose Level Lipid in Rat. *Journal of Shaheed Sadoughi University of Medical Sciences Yazd*, 1390; 19 (3): 388-397.
 14. Rashki Kemmak M, Gol A, Dabiri SH, Javadi A. Preventive and therapeutic role of garlic in kidney tissue damage from diabetes mellitus in rats. *Journal of Biology of Iran*. 2011; 24 (5). 694-706.
 15. Khalili Sigaroudi F, Jarvandi S, Taghi Zadeh M. Therapeutic applications of medicinal herbs. Tehran, publication: Arjomaqnd, 2010.
 16. Parastouei K, Ravanshad SH, Mostafavi H, Sotoudeh Maram A. The effect of consumption of garlic pills on blood glucose, plasma lipids and blood pressure in type II diabetic patients with hyperlipidemia. *Journal of Medicinal Plants Kashan University of Medical Sciences*, 2005; 5 (1): 48-54.
 17. Kumar R, Chhatwal S, Arora S, Sharma S, Singh J, Singh N, et al. Anti hyperglycemic, anti hyperlipidemic anti-inflammatory and adenosine deaminase-lowering effects of garlic in patients with type 2 diabetes mellitus with obesity. *Diabetes MetabSyndrObes*, 2013; 6: 49-56.
 18. Afkhami Ardakani M, Kamali Ardakani A. The effect of garlic on serum lipids and glucose in type 2 diabetic patients. *Journal of Shaheed Sadoughi University of Medical Sciences Yazd*, 2008; 13 (1): 8-11.



This work is licensed under a Creative Commons Attribution