

Original Research Article

Garlic: an alternative in reducing blood glucose on diabetic patients

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ABSTRACT

Background: Diabetes mellitus (DM), a metabolic disorder characterized by an increasing of blood sugar (hyperglycemia). Medication is one of the seven pillars of diabetes management. Garlic (*Allium sativum*), an alternative herb, also has an antidiabetic effect. The purpose of this study was to investigate the effect of garlic on the blood sugar level in type 2 diabetes mellitus.

Methods: This study was a quasi-experimental design with two group post-test design. The participants were DM patients who only take medication without any supplemental herbs. The respondents were divided into two group; intervention group, given antidiabetic drugs and consume garlic 3 pieces of garlic/day for 2 weeks and control group only got antidiabetic drugs. Data were collected by performing blood sugar measurement using glucose-check on all respondents using capillary blood in the fingertips. Second measurement were taken after monitoring the consumption of garlic together with drugs for two weeks. Hypothesis testing used independent T-Test test.

Results: The study result found that the average of blood sugar level after administering the treatment is 240 mg/dl in the intervention group, and 284 mg/dl in control group. It can be concluded that the administration of 3 pieces of garlic combining with antidiabetic drugs for 2 weeks has not been able to reduce blood sugar levels into normal limits.

Conclusions: This combination found to lowering the blood sugar levels in a significant amount compare to only drugs. The length of the therapy could consider as a significant predictor.

Keywords: Blood glucose, Diabetes mellitus, Garlic

INTRODUCTION

Diabetes mellitus (DM), a metabolic disorder characterized by an increasing of blood sugar (hyperglycemia), is caused by insulin damage.¹ According to the International Diabetes Federation (2017), the global prevalence of DM is tending to be higher from year to year. Indonesia is one of the six countries with the highest number of DM patients in the world, the number reach 10.3 million.

Persistent hyperglycemia leads to an oxidative stress. Therefore, overcoming of this problem is the key point of diabetes management. Recently, the management of

diabetes focused on seven point called seven pillars of diabetes, which are eating a healthy diet, staying fit with exercise, taking the medication, blood sugar levels monitoring, managing stress, discovering how to solve-problem, reducing risk with healthy behaviors and regular medical checkup. As for the medication, patients are given oral hyperglycemic drugs and insulin administration.²

Controlling blood sugar levels could be by oral antihyperglycemic drugs and insulin. However, some people struggle with medication adherence due to the number of medications prescribed or the dosing schedule. Besides, the side effects of this medication such as

hypoglycemia, anemia, impaired absorption of vitamin B, and digestive disorders also should be kept in mind. In the other hand, the use of herbs as natural ingredients to support the therapy should be considered as an alternative. It is because the advantages of natural ingredients are known as an alternative in reducing the side effects of chemical drugs.³ Garlic (*Allium sativum*), often used for maintaining health, is one of the antidiabetic herbs. It can be used as a treatment for diabetes, hypertension, hypercholesterolemia, arthritis rheumatoid, fever or prevention of atherosclerosis, and also inhibitors tumor growth especially by its sulfur content.⁴

The main function of garlic on diabetes is in maintaining blood sugar level. This herb can decrease glucose level. The component such as allyl propyl disulfide and allicin in garlic can be used as antihypertension which reduce the blood pressure, urine protein and plasma creatinine levels. Garlic also protects the kidneys from diabetes nephropathy.⁵ Allicin have function in increasing liver metabolism, insulin secretion and controlling lipid peroxidation. It is also improving the antioxidant status of cells such as superoxide dismutase, catalase and glutathione peroxidase. Thus, garlic is beneficial for the body because it protects cells from the effects of oxidative stress due to hyperglycemia.⁶ Regular consumption of garlic can improve lipid profile, reduce triglycerides, low-density lipoprotein and increase high-density lipoprotein. The sulfur component in this herb can increase insulin secretion and insulin sensitivity.⁷ Research has found that raw garlic has an antidiabetic effect. In a study where garlic are given as a supplement without the addition of other antidiabetic drugs result a significant decrease in fasting blood glucose levels in 1-2 weeks.⁸ Thus, revealed that garlic (*Allium sativum*) had a significant effect on increasing glycemc status.

METHODS

This study was a quasi-experimental design with two group post-test design. Twenty respondents are included with the inclusion criteria are diabetic patients who only take medication without any supplemental herbs, patients who are diagnosed diabetes and have another diseases are excluded.

This study was conducted at the Lumpo Public Health Center, Pesisir Selatan, West Sumatera, Indonesia from March 2019 to April 2019. Ethical clearance was

obtained from Medicine Faculty of Andalas University, Padang, Indonesia.

The respondents were divided into two group; intervention group, given antidiabetic drugs and consume garlic 3 pieces of garlic/day for 2 weeks and control group only got antidiabetic drugs. The tools and materials used in this study were glucocheck with the brand ACCU CHEK, lancet, syringe 3 cc, lancet pen, cotton, 70% alcohol, blood glucose test strip and garlic. Data were collected by performing blood sugar measurement using gluco-check on all respondents using capillary blood in the fingertips. Second measurement is taken after monitoring the consumption of garlic together with drugs for two weeks in intervention group and only antidiabetic drugs in control group. Hypothesis testing used independent T-Test test with p value<0.05. Statistical analysis showed no significant difference between blood sugar levels in the control group and the intervention group after garlic administration (p>0.05).

RESULTS

Based on the results of the study in Table 1 showed that the average of blood sugar level in the intervention group is 305.6 mg/dl, standard deviation of 58.392, and in control group is 343.90 mg/dl, standard deviation of 82.534. This indicated occurrence of hyperglycemia in both groups.

Table 2 presented the average of blood sugar level in the intervention group and control group. After taking 3 pieces of garlic per day together with antidiabetic drugs for 2 weeks in intervention drugs, the mean blood sugar level is 240 mg/dl (SD 56.19) and in the control group is 284 mg/dl (SD 58.89).

Table 1: Blood sugar levels of DM patients type 2 before garlic consumption.

Groups	N	Mean	Standard deviation
Control	10	343.9	82.534
Intervention	10	305.6	58.329

Table 2: Blood sugar levels of DM patients type 2 after consumption of garlic.

Group	N	Mean	Standard deviation
Control	10	240	56.190
Intervention	10	284	58.891

Table 3: Effect of garlic on the blood sugar level in type 2 diabetes mellitus.

Intervensi dan Kontrol	Levene's test for quality of variance		T-test for equality of means				
	F	Sig	T	df	P value	95% CI of the difference	
						Lower	Upper
Equal variance assumed	0.207	0.654	1.717	18	0.103	98.278	9.878
Equal variance not assumed			1.717	17.96	0.103	98.286	9.886

Table 3 showed that there is no significant difference between blood sugar levels in the control group and the intervention group after garlic administration ($p > 0.05$). It can be concluded that there is no significant effect of giving garlic combined with antidiabetic drugs to the blood sugar levels of type 2 DM patients after 2 weeks of treatment.

DISCUSSION

Hyperglycemia is one of the signs and symptoms of DM. Based on the respondent's characteristics, half of the respondents (50%) are elderly, almost all respondents (80%) are female and more than half (60%) with high blood pressure. Elder people face some challenges in the physiological change, one of them is insulin resistance. It is caused by changing in the body composition in elderly, where more fat mass than muscle; decreasing physical activity; hormonal factors; diet imbalance, high carbohydrates consumption. The same results were also obtained in DM patients at the Gombok Health Center in Sijunjung District, 50% of patients were over 45 years old.⁹

Gender also influence the blood sugar levels. Female are tended to be at risk for obesity compare to male. Obesity is one predictors of insulin resistance. High percentage of free fatty acids in the blood leads to lower glucose transport into cells. In the other hand, estrogen levels also delay the mobilization of fat in blood vessels and caused insulin resistance which prohibited the absorption of glucose into the cells Thus, this condition resulted women are more at risk of developing DM.^{10,11}

High blood pressure affects the sensitivity of cells towards insulin. Chronic hypertension increases the occurrence of insulin resistance. In the carbohydrate metabolism, insulin is the key component to absorb blood sugar into a cell. However, the insulin resistance cause the body to have less response to the increasing of blood sugar.^{1,12}

Both groups showed that there were decreasing of blood sugar levels after administering DM drugs and combination of DM with garlic. However, administering garlic with antidiabetic drugs lowering the blood sugar levels in a significant amount compare to only drugs. This evinces that combining DM drugs together with garlic generate a better result of medication. In this study, the deflation on glucose level were still not reach the normal limits. This can be assumed that applying antidiabetic drugs together with garlic only for two weeks has not been effective in reducing blood sugar levels to normal levels.

The results of this study is different from the research by which found out that there is a significant effect of administration of garlic combined with metformin for 12 weeks on the average of blood sugar level with mean is 6.30 mg/dl after administration of garlic combined with

metformin for 12 weeks.¹³ The statistical analysis indicated that the fasting blood sugar levels decreased significantly after 12 weeks treated with metformin supplementation accompanied by garlic consumption compared to before garlic supplementation ($p < 0.001$) and after 12 weeks of metformin supplementation ($p < 0.05$). However, the length of the therapy administration should be considered as the associated factors to the study result.

Garlic can improve metabolic syndrome such as hyperglycemia, hypercholesterolemia and hypertension. The ability of garlic in reducing lipid peroxidation is through mechanism of reducing levels of malondialdehyde. This resulting a protection of heart blood vessels from damage due to oxidative stress¹⁴. In addition, late eating dinner behavior also bring negative side effect on the blood sugar level in diabetic patient. Around 30% of this study respondents habitually had dinner at night. Bad diet management affects the high levels of blood glucose although they had consumed metformin.^{15,16}

CONCLUSION

The study found that the administration of 3 pieces of garlic combining with antidiabetic drugs for 2 weeks has not been able to reduce blood sugar levels into normal limits. However, this combination found to lowering the blood sugar levels in a significant amount compare to only drugs. The length of the therapy could consider as a significant predictor. In addition, the consumption of garlic must also be followed by lifestyle changes such as diet, exercise and stress management.

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