

The Effect of Consuming Garlic (*Allium sativum L*) on Cholesterol Levels of Young Girls

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ABSTRACT

The South Ogan Komering Ulu District Health Office noted an increase in cholesterol sufferers in 2020 of 743 people; in 2021, there were 870 people, and in 2022, there were 922 people. High cholesterol cases are caused by several risk factors, such as lack of physical activity, unhealthy eating patterns, smoking, and excessive alcohol consumption. Garlic can be chosen as an alternative to lower blood cholesterol levels. Garlic contains allin which can increase HDL synthesis and slow down the endogenous synthesis of cholesterol. The purpose of this study was to determine the effect of the consumption of garlic (*Allium sativum L*) on cholesterol levels in female adolescents. This research uses a quasi-experiment with a one-group Pretest-Posttest design. The population is a teenage daughter with moderate cholesterol (> 200 mg/dl to 239 mg/dl) of 30 adolescents in July 2023. Samples researcher using total sampling where teenagers will be given garlic capsules at a dose of 2x500 mg per day for 14 days. The instruments used were garlic capsules, sheets of observation, and technical instructions for checking cholesterol levels. A data analysis using the Paired Samples Test. The average cholesterol level of female adolescents before being given garlic was 219.53, while after being given garlic, it was 194.27. Bivariate results show a p-value of 0.00 0 < 0.05. There is an influence of the consumption of garlic (*Allium sativum L*) on cholesterol levels of young women in Tanjung Menang Ilir Village, South Ogan Komering Ulu District, South Sumatra in 2023. It is hoped that adolescents will be able to use garlic as an herbal remedy for cholesterol-lowering therapy so that it can be controlled and stable within normal limits.

Keywords: garlic; cholesterol levels; adolescents

INTRODUCTION

In both developed and developing countries, the development of modern times has changed the habits of human life patterns. One is dietary habits, such as fast food containing high fat and cholesterol. Eating foods high in fat and cholesterol triggers increased cholesterol levels in the blood and is the cause of about a third of all cardiovascular diseases in the blood (Zahra et al., 2019).

Based on the World Health Report Organization (WHO), there were 4.4 million deaths due to hypercholesterolemia or 7.9% of the total number of deaths at a relatively young age. The highest prevalence of hypercholesterolemia by sex is occupied by the European region with a total of 54%, followed by the Americas with a total of 48%, then Southeast Asia with 29.0%, and the African region with 22.6%. Based on data from the American Heart Association (AHA) in 2020, Americans aged ≥ 20 years and over have total cholesterol levels > 200 mg/dl for men of 45.3 million and 53.6 million for women (Yuningrum, 2022).

In Indonesia, the prevalence of cholesterol in the total population for workers is 13.4%, and for those who do not work, it is 9.4%. The prevalence of hypercholesterolemia continues to increase, where at the age of 25-34 years, the prevalence of this disease is 9.30%, and aged more than 55 years to age less than 65 years, 15.50% (Rikesdas, 2018). The proportion of the Indonesian population with borderline (200–239mg/ dL) and high (≥ 240 mg / dL) total cholesterol levels is more common in women, namely 24% and 9.9% when compared to men of 18.3 % and 5.4%7 (Putri et al., 2020).

According to provincial data, the percentage of visitors with high cholesterol in 2020 in the province of South Sumatra is 24.5%. Meanwhile, data from the South Ogan Komering Ulu District Health Office showed that in 2020, the

number of high cholesterol levels was 743 people. Based on data, in 2021, there were 870 people with high cholesterol levels; in 2022, the number of patients with high cholesterol levels checked was 922 (OKU South Health Office, 2022).

Increased blood cholesterol can strike at a young age in people aged ≥ 15 years according to sex, cholesterol levels in women and men will increase. This is caused by several risk factors such as lack of physical activity, unhealthy eating patterns such as fast food, which usually contains high fat, high cholesterol and low fiber intake, smoking, and excessive alcohol consumption (Yuningrum, 2022). Engaging in risky behavior as an adolescent can lead to serious consequences such as death or illness. This includes smoking, living recklessly, engaging in activities that may lead to injury or violence, consuming alcohol and illegal drugs, and following unhealthy diets (Kurniyawan et al., 2023).

High cholesterol in young women can have a negative impact on health. An increase in 100 mg /day of fat consumption can increase total cholesterol by 23 mg /dl. This situation can have an impact on the process of cholesterol biosynthesis. Having elevated LDL cholesterol levels at a young age increases the risk of developing heart disease, and the increased risk persists, even in those who are later able to lower their LDL cholesterol levels. The impact of cholesterol on sufferers is quite disturbing to sufferers' activities due to signs and symptoms such as dizziness, weakness, and swollen feet (Mutmainah S, 2022).

Cholesterol synthesis is influenced by several factors, including a decrease in HMG- CoA activity reductase which can reduce cholesterol synthesis (Saputra, 2020). Aside from pharmacological ways to reduce cholesterol synthesis, one solution is by regularly consuming garlic. Garlic can be chosen as an alternative to lower blood cholesterol levels. Garlic contains alliin, which can increase HDL synthesis and slow down the endogenous synthesis of cholesterol. Research also finds that consuming garlic regularly, around 2-3 cloves daily, can help lower cholesterol levels, prevent heart attacks, and help shrink blockages in the heart arteries, thereby minimizing heart attacks (Ulaen, 2023).

Based on research conducted by Nababan (2022). After consuming 200 mg (0.2 gr) of garlic every day for 6 weeks, it showed that the cholesterol levels in the respondents decreased from the results of the pre-test data. test and post-test, namely from an average of 108.80 at the time of pre-test to 92.60 at the time of post-test with a p-value of 0.015, means that there is an effect of garlic consumption on reducing cholesterol levels.

The results of research conducted by Ernawati (2022) showed that there was a decrease in cholesterol levels in respondents after being given garlic capsules containing a composition of 1.2 grams of garlic extract, in capsule dosage form, at a dose of 2x500 mg/day for 6 weeks so it can be concluded that There is an effect of consuming garlic oil capsules (*Allium sativum L*) to decrease total cholesterol levels.

Based on a preliminary study conducted on Sunday, May 11, 2023, in Tanjung Ilir Village, there were 23 young women who had their cholesterol checked, 60.9% of young women who had cholesterol levels > 200 mg /dl, 30.5% of young women had cholesterol levels cholesterol 200-239 mg / dl (high threshold category), while 8.6% of female adolescents have cholesterol levels ≥ 240 mg/dl (high category). It was found that an increase in cholesterol levels for teenage girls was given medication, and it was recommended to reduce fatty foods and exercise, so this is an important thing that must be given special attention so that there is no increase in the following year.

Based on the background above, the authors are interested in researching the effect of garlic consumption (*Allium sativum L*) on cholesterol levels of female adolescents in Tanjung Menang Ilir Village, South Ogan Komering Ulu District, South Sumatra.

METHOD

This study used a quasi-experiment with a one-group pretest-posttest design. The population in this study were all young women with moderate cholesterol (> 200 mg /dL to 239 mg /dL) of 30 adolescents in July 2023. The sampling technique in this study used total sampling, which means that the entire population is used as a sample in this study. Researchers examined cholesterol levels in adolescents, then provided garlic capsule intervention in capsule preparations at a dose of 2x500 mg daily for 14 days and re-examined cholesterol levels. The instruments used were observation sheets and technical instructions for checking cholesterol levels and garlic capsules. Data analysis used the paired t-test.

RESULT

Table 1. Average Female Cholesterol Levels

Group	N	Means	SD	Min	Max
Before	30	219.53	8,249	203	235
After	30	194.27	12,921	172	229

Table 1 shows that from 30 young women before being given the garlic intervention, the average cholesterol level was 219.53, with a minimum value of 203 and a maximum of 235. After being given the garlic intervention, the average cholesterol level was 194.27, with a minimum value of 172 and a maximum of 229.

Table 2. The Effect of Consuming Garlic (*Allium sativum L*) on Female Adolescent Cholesterol Levels

Group	N	Means	p-value
Before	30	219.53	<0.001
After	30	194.27	

Based on Table 2. the results of the study obtained a p-value of <0.001, meaning ≤ 0.05 , with an average cholesterol level of before the intervention of 219.53 and after being given the garlic intervention in capsule dosage form, with a dose of 2x500 mg/day of 194.27 so it can be said that There is an effect of consumption of garlic (*Allium sativum L*) on cholesterol levels in female adolescents.

DISCUSSION

Based on the study's results, it was shown that before the garlic intervention was given, the average cholesterol level was 219.53. After the garlic intervention was given, the average cholesterol level was 194.27. High cholesterol levels in the blood are a serious problem because it is a risk factor for various non-communicable diseases, such as obstruction of blood vessels in carrying blood flow to and from the heart, which will cause problems such as atherosclerosis (blockage of blood vessels). coagulation (clotting of blood vessels), and dyslipidemia (weakness in the blood) (Yoentafara, 2017 in Karimah, 2022).

Aside from pharmacological ways to reduce cholesterol synthesis, one solution is by regularly consuming garlic. Garlic can be chosen as an alternative to lower blood cholesterol levels. Based on the results of the study, it was obtained that the p-value was <0.001, meaning ≤ 0.05 , so it could be said that there was an influence on the consumption of garlic (*Allium sativum L*) on cholesterol levels in female adolescents. The ability of garlic to reduce cholesterol synthesis through 2 mechanisms, namely inhibiting the reaction of the HMG-CoA-reductase enzyme and inhibiting other enzymes such as squalene monooxygenase. Decreased levels of total cholesterol, LDL cholesterol, triglycerides, and increased HDL cholesterol levels are partly due to garlic's alien and allicin content (Varshney, 2016).

The γ -glutamyl-cysteine compound is an intermediate compound in forming other organosulfur compounds, including alliin and S-allyl cysteine (SAC). The alliinase enzyme will then convert alliin to allisin. Allisin is a precursor for the formation of allyl sulfide compounds, for example, diallyl trisulfide (DATS), diallyl disulfide (DADS), diallyl sulfide (DAS), and dipropyl disulfide (Zhang, 1999 in Samosir 2020). The results of this study are supported by research conducted by Warshafsky et al stated that patients with total cholesterol levels > 200 mg / dL who consumed 1 clove of garlic/day could experience a decrease in total cholesterol levels by up to 9% (Warshafsky, 1993 in Samosir, 2020).

Garlic processing converts allinase compounds into allisin. Allisin will quickly change to other forms, such as diallyl sulfide (DAS), diallyl disulfide (DADS), diallyl trisulfide (DATS), and adjoins. Garlic contains bioactive components that play a role in reducing cholesterol in the body, including DADS and allisin. DADS has an allyl chain, which is easily reduced to a saturated propyl chain, thereby reducing the levels of NADPH and NADH, which are important for synthesizing triglycerides and cholesterol. Allisin itself will compete with acetate to produce input of acetyl Co-A, a substrate for cholesterol synthesis. Thus, garlic can lower cholesterol (Riafiana F, 2017).

Garlic also has the effect of lowering total cholesterol by inhibiting its synthesis mechanism. Garlic compounds that show inhibitory activity are selenocysteine, SAC, aliin, DATS, and DADS. The enzyme inhibition reaction is irreversible. There are two possible inhibition mechanisms, namely inhibition of the enzyme reaction hydroxymethylglutaryl-CoA

reductase and inhibition of other enzyme reactions, such as squalene monooxygenase and lanosterol - 14-demethylase (Riafiana F, 2017).

Research conducted by Siti Marlina (2020) concluded that there was an effect of giving garlic on reducing cholesterol levels at the Delitua Health Center in Deli Serdang Regency in 2020 with a value (p -value $0.001 > \alpha 0.05$). This aligns with research conducted by Ulaen (2023) on the effect test of single garlic juice (*Allium sativum* L) on cholesterol, hypertension, diabetes, and gout in adults. Statistical test results showed that giving a single garlic juice before and after treatment affected measuring cholesterol levels, body weight, blood pressure, uric acid, and glucose in respondents.

Based on the results of research, theory, and related research, researchers assume that consuming garlic can reduce cholesterol levels, especially the allicin compound contained in it. Several other research results show that the consumption of garlic can help lower total cholesterol levels, lower LDL cholesterol levels (bad cholesterol), and increase HDL cholesterol levels (good cholesterol). Allicin is an active compound in garlic believed to have antioxidant and anti-inflammatory properties that contribute to these potential benefits. However, remember that garlic's effect on cholesterol may vary from individual to individual. Some of the factors that affect the decrease in cholesterol levels cannot be ascertained by researchers because the activities and daily consumption carried out by adolescents are beyond the control of researchers.

CONCLUSION

Based on the results of data analysis and statistical calculations, it was obtained that the average cholesterol level of female adolescents before being given garlic was 219.53, and after being given garlic was 194.27, and the results of statistical tests obtained $p < 0.001$, so it can be concluded that there is an effect of onion consumption white (*Allium sativum* L) on cholesterol levels of young women in Tanjung Menang Ilir Village. It is hoped that the results of this study can be used as information and reference to increase adolescent knowledge and utilize garlic as an herbal medicine to help reduce cholesterol levels so that they can be controlled and stable within normal limits.

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