

Original Article

Black garlic for cholesterol in the community of Kudus District, Central Java

Sukesih Sukesih¹, Heny Siswanti¹, Moh Zaki Mubarak¹

¹ Nursing Department, Nursing and Health Sciences Faculty, Universitas Muhammadiyah Kudus, Indonesia

Article Info

Article History:

Submitted: May 2nd 2023

Accepted: May 10th 2023

Published: June 25th 2023

Keywords:

black garlic; cholesterol;
society

Abstract

High cholesterol is a health problem for the body because it can cause several diseases, including heart disease, stroke, and diabetes mellitus. An increase in cholesterol in the blood can be prevented by using the active substance in garlic in the form of alliin. Allin is a chemical containing sulfur which gives garlic its distinctive aroma. The research aimed to determine the effect of black garlic on cholesterol in the community of Purwosari Kudus Village. The quasi-experimental method with pretest-posttest control group design data analysis using paired t-test and independent test of giving garlic using SOP. The research population was 40 respondents, a research sample of 34 respondents using a purposive sampling technique consisting of 17 respondents in the intervention group and 17 respondents in the control group. The results of the research show that there is an effect of black garlic on cholesterol in the community in Purwosari Kudus Village in the intervention group with a statistical test with a p-value of $0.000 < 0.05$.

INTRODUCTION

Cholesterol is a manifestation of the problem of excess nutrition, which needs to be paid attention to because the prevalence of cholesterol continues to increase from year to year.¹ High cholesterol is a serious problem because it is one of the main factors for the occurrence of heart disease, another problem in someone who has high blood pressure and smokers.² The prevalence of hypercholesterolemia is still high.³ The prevalence of hypercholesterolemia in the world is around 45%, in Southeast Asia around 30% and in Indonesia 35%, hypercholesterolemia can only be detected by blood tests. If the cholesterol level is

>200 mg/dL, then it is said to be suffering from hypercholesterolemia.⁴

The allin content in garlic can also inhibit cholesterol synthesis, thereby preventing the emergence of heart disease. Garlic is an ingredient that is easy to obtain and its use is very widespread in various countries.⁵ Garlic is usually used as a flavoring, food additive, and traditional medicinal plant because it contains antimicrobial compounds such as triperpenoids, alkaloids, saponins, proteins, sterols, and flavonoids.⁶ as well as antibacterial activity such as allicin compounds which has quite high antioxidant activity. Black garlic also has quite high antibacterial content so it can cure diseases more effectively. The process of making black onions is fermentation at a

Corresponding author:

Sukesih Sukesih

sukesih@umkudus.ac.id

South East Asia Nursing Research, Vol 5 No 2, June 2023

ISSN:2685-032X

DOI: <https://doi.org/10.26714/seanr.5.2.2023.36-40>

temperature of 67°C and humidity of 80% within ± 21 to 22 days.⁷ Black garlic contains the main biologically active component, namely S-allylcysteine (SAC), which is an organo-sulfur compound that has the potential to act as an antioxidant. The SAC content in black garlic is five times higher than in garlic.⁸

Based on research conducted by Chun-Yu Chen et al., Department of Food Science, Fu Jen Catholic University, New Taipei City 24205, Taiwan with the title "Effects of Black Garlic Extract and Nanoemulsion on the Deoxy Corticosterone Acetate-Salt Induced Hypertension and Its Associated Mild Cognitive Impairment in Rats". This research used In Morris water maze test, they could significantly decrease escape latency and swimming distance and increase the time spent in the target quadrant, accompanied by a decline of acetylcholinesterase activity and malondialdehyde level in the hippocampus as well as a rise in glutathione level and activities of superoxide dismutase, catalase and glutathione peroxidase. In addition, the levels of tumor necrosis factor, interleukin-6 and interleukin-1 β were reduced. Effects of lowering blood pressure and improving learning/memory ability in rats followed the order: lisinopril > black garlic nanoemulsion > black garlic extract.⁹

METHODS

This type of research is quantitative research with a research design using a quasi experiment with a pre-test post-test control group approach. Pretest-posttest with control group research which aims to reveal the differences between before and after the intervention and compare with the control. In this study there was a control group or comparison of subjects. Where before and after the subjects were given the intervention to consume black garlic first, cholesterol levels were measured in the community. The population in this study was 36 cholesterol sufferers from the

Purwosari community based on data from the Purwosari Community Health Center. The number of samples used as respondents was 34 people with hypercholesterolemia, so 16 people were in the control group and 17 people were in the intervention group. The sampling technique used in this research was purposive sampling,

The inclusion criteria in this study are: Have no history of garlic allergy, People in Purwosari Kudus Village exclusion criteria are: Do not want to be a respondent, Experiencing digestive disorders Data analysis used paired t-test and independent test. The instrument for administering black garlic uses SOP.

RESULTS

Based on the table 1, it can be seen that the average age of the intervention group is 38 and the average age of the control group is 36. A research study has shown that in the intervention group there were 10 (58.8%) male respondents and 7 (41.2%) female respondents, while in the control group there were 9 (52.9%) male respondents and 9 (52.9%) male respondents. women as many as 8(47.1%).

Table 1
The characteristics of respondents Age

Indicators	Group	
	Intervention	Control
Age	38.18 (22-50)	35.76 (25-49)

Based on the results of the post test using the Independent Sample Test, a significant result of 2 failed was obtained. Sig is P value = 0.000 < α (0.05) indicates that there is a difference in the intervention group and the control group.

Table 2
Differences in Cholesterol Levels Before (Pre-test) and After (Post-test) in the Intervention and Control Groups

Indicators	Group		p
	Intervention	Control	
Cholesterol			
Before	215.94 (\pm 29.750)	216.76 (\pm 34.412)	0.941
After	188.59 (\pm 17.277)	205.41 (\pm 17.653)	0.038
p	0.000	0.098	

DISCUSSION

The results of the analysis in the intervention group using the Paired Sample Test statistics obtained P value = 0.000, which is smaller than the significance level value $\alpha < 0.05$. So the calculated P value means that H_0 is rejected and H_a is accepted. It can be concluded that there is an influence of black garlic on cholesterol levels in the community in Purwosari sub-district. Meanwhile, the results of the analysis in the control group using the Paired Sample Test statistics obtained P value = 0.098 which was greater than the significance value $\alpha > 0.05$. So the P value table more than the calculated P value then H_0 is accepted and H_a is rejected, this can be concluded that there is a change in cholesterol levels but it is not optimal.

Based on the results of the post test using the Independent Sample Test, a significant result of 2 failed was obtained. Sig is P value = $0.000 < \alpha (0.05)$ indicates that there is a difference in the intervention group and the control group. statistical test results if P is 0.000. The results of statistical test analysis show that for the cholesterol variable the P value is 0.000. From these results it can be concluded that there is a significant effect on cholesterol before and after being given black garlic ($p \text{ value} < \alpha = 0.05$).

Black garlic contains many bioactive compounds that are antioxidants. The main function of these antioxidants is to protect body cells from damage due to exposure to free radicals which are the cause of various diseases. Researchers say that the antioxidant content in black garlic can reach twice that of garlic in general. Some of the antioxidant content in black garlic includes

alkaloids, polyphenols, flavonoids, S-Allylcysteine (SAC).¹⁰

Apart from functioning as an antioxidant, flavonoids are also able to reduce blood cholesterol levels because flavonoids work to increase HDL cholesterol by increasing the production of apo AL. The amount of SAC itself in black garlic is five to six times higher than in fresh garlic. Fresh garlic contains γ -glutamyl -S-allylcysteine which can be hydrolyzed and oxidized to form allin. Allin is converted into allicin by allinase after going through the process of crushing, cutting, chewing, or heating. Heating will cause the change in GSAC (γ -Glutamyl-S-allylcysteine) to SAC (S-allylcysteine).¹¹

Previous research results were supported which was carried out at the Ministry of Health's Public health center Tambaksari where the results of the statistical test were if P was 0.000. The results of statistical test analysis show that for the cholesterol variable the P value is 0.000. From these results it can be concluded that there is a significant effect on cholesterol before and after being given black garlic ($p \text{ value} < \alpha = 0.05$).¹²

There was a change before being given black garlic, the average value was 236.29 mg/dl and after being given black garlic it was 205.71, there was a difference of 30.58 mg/dl and from the results of statistical tests the value $P = 0.000$ ($p\text{-value} < 0.05$). These results show that there is a statistically significant effect on giving black garlic before and after the intervention. The reduction in cholesterol is an effect of giving black garlic. Based on the results of the data above, it can be shown that black garlic has more influence, so it can be concluded that

there is a significant influence on cholesterol levels after being given black garlic, although both experience a decrease in cholesterol levels, but it is less than optimal.

There was a change before being given black garlic, the average value was 236.29 mg/dl and after being given black garlic it was 205.71, there was a difference of 30.58 mg/dl and from the results of statistical tests the value $P = 0.000$ (p-value < 0.05). These results show that there is a statistically significant effect on giving black garlic before and after the intervention. The reduction in cholesterol is an effect of giving black garlic.

Based on the results of the data above, it can be shown that black garlic has more influence, so it can be concluded that there is a significant influence on cholesterol levels after being given black garlic, although both experience a decrease in cholesterol levels, but it is less than optimal.¹³

CONCLUSION

There is an influence of black on cholesterol levels in the people of Purwosari sub-district, Kudus sub-district, Kudus city. There were no maximum results in providing health care for cholesterol levels in the community in Purwosari Village, Kudus District, Kudus City Regency. There is a difference in cholesterol levels after being given treatment in the intervention group and the control group in Purwosari Village, Kudus District, Kudus Regency City.

ACKNOWLEDGMENT

This research is the result of my research, I made my own black garlic by cooking it using magic com for 10 days. The results of this study show that consuming black garlic can lower cholesterol because black garlic contains flavonoids which are useful for lowering cholesterol levels.

CONFLICT OF INTEREST

There is no conflict of interest to declare from this research.

REFERENCES

1. Horn CL, Morales AL, Savard C, Farrell GC, Ioannou GN. Role of Cholesterol-Associated Steatohepatitis in the Development of NASH. *Hepatology Communications*. 2022;6:12–35.
2. Sholiha A, Imania DR, Fis M, Riyanto A, KM S, Fis M. Efektivitas Aerobik Exercise Terhadap Penurunan Kadar Kolesterol Tinggi: Narrative Review. 2021;
3. Duan Y, Gong K, Xu S, Zhang F, Meng X, Han J. Regulation of cholesterol homeostasis in health and diseases: from mechanisms to targeted therapeutics. *Signal Transduction and Targeted Therapy*. 2022;7.
4. Permatasari R, Suriani E, Kurniawan. Hubungan Kadar Kolesterol Total Dengan Tekanan Darah Pada Pasien Hipertensi Pada Usia ≥ 40 Tahun. *Jurnal Labora Medika*. 2022;6:16–21.
5. Nakano T, Inoue I, Murakoshi T. A newly integrated model for intestinal cholesterol absorption and efflux reappraises how plant sterol intake reduces circulating cholesterol levels. *Nutrients*. 2019;11:1–18.
6. Ahmed T, Wang CK. Black garlic and its bioactive compounds on human health diseases: A review. *Molecules*. 2021;26.
7. Chang WC, Lin WC, Wu SC. Optimization of the Black Garlic Processing Method and Development of Black Garlic Jam Using High-Pressure Processing. *Foods*. 2023;12.
8. Stępień AE, Trojniak J, Tabarkiewicz J. Anti-Cancer and Anti-Inflammatory Properties of Black Garlic. *International Journal of Molecular Sciences*. 2024;25:1–15.
9. Chen CY, Tsai TY, Chen BH. Effects of black garlic extract and nanoemulsion on the deoxy corticosterone acetate-salt induced hypertension and its associated mild cognitive impairment in rats. *Antioxidants*. 2021;10.
10. Pakakaew P, Phimolsiripol Y, Taesuwan S, Kumphune S, Klangpetch W, Utama-ang N. The shortest innovative process for enhancing the S-allylcysteine content and antioxidant activity of black and golden garlic. *Scientific Reports*. 2022;12:1–11.
11. Kilic-Buyukkurt O, Kelebek H, Bordiga M, Keskin M, Selli S. Changes in the aroma and key odorants from white garlic to black garlic using

- approaches of molecular sensory science: A review. *Heliyon*.2023;9:e19056.
12. Suarsih C. Hubungan Pola Makan Dengan Kejadian Kolesterol Pada Lansia Di Wilayah Kerja Puskesmas Tambaksari. *Jurnal Keperawatan Galuh*.2020;2.
 13. Najman K, Sadowska A, Buczak K, Leontowicz H, Leontowicz M. Effect of Heat-Treated Garlic (*Allium sativum* L.) on Growth Parameters, Plasma Lipid Profile and Histological Changes in the Ileum of Atherogenic Rats. *Nutrients*.2022;14.