

THE EFFECT of GIVING BLACK GARLIC on THE LOWERING of BLOOD PRESSURE of UNCONTROLLED HYPERTENSIVE PASIENT

PENGARUH PEMBERIAN BAWANG PUTIH HITAM TERHADAP PENURUNAN TEKANAN DARAH YANG TIDAK TERKENDALI PASIEN HIPERTENSI

Mujito, Dewi Rachmawati✉, Zinedine Zidney Arrad-Mizan

Departemen of Nursing, Poltekkes Kemenkes Malang, Indonesia

Correspondence Email: dewi_rachmawati@poltekkes-malang.ac.id

ABSTRACT

Hypertension as a silent killer is the most common cause of premature death. Most hypertensive patients are not aware that they have hypertension or are not aware of the treatment. Control efforts are needed, one of which is non-pharmacological therapy using black garlic. The aim is to determine the effect of giving black garlic on reducing blood pressure in uncontrolled hypertension patients. The research design was a pre-experimental one-group pretest and posttest design, a sample of 20 patients with undiagnosed or uncontrolled hypertension was taken by purposive sampling technique. Data collection was carried out by measuring blood pressure before and after the intervention by giving 2 pieces of black garlic, 2 times per day for 1 week, statistical tests using Paired sample t-test. The results showed that the average systolic and diastolic blood pressure before the intervention was 152.25 mmHg and 95.25 mmHg. After the intervention, the average systolic and diastolic blood pressure was 135.15 mmHg and 81.50 mmHg, and the p-value was 0.001, which means that there was an effect of giving black garlic on reducing blood pressure in uncontrolled hypertension patients. Giving black garlic inhibits the activity of angiotensin-converting enzymes, especially angiotensin II, thereby increasing the relaxation of blood vessels which can further reduce blood pressure.

Keywords: black garlic; blood pressure; uncontrolled hypertension

ABSTRAK

Hipertensi sebagai silent killer merupakan penyebab paling umum kematian dini. Sebagian besar pasien hipertensi tidak sadar mengidap hipertensi atau tidak mengetahui pengobatannya. Diperlukan upaya pengendalian yang salah satunya adalah terapi non farmakologi menggunakan black garlic. Tujuan untuk mengetahui pengaruh pemberian black garlic terhadap penurunan tekanan darah penderita hipertensi yang tidak terkontrol. Desain penelitian adalah pre-experimental one group pretest and posttest design, sampel 20 penderita hipertensi tidak terdiagnosis atau tidak terkontrol diambil dengan teknik purposive sampling. Pengumpulan data dilakukan dengan mengukur tekanan darah sebelum dan sesudah intervensi dengan pemberian 2 buah bawang hitam, 2 kali per hari selama 1 minggu, uji statistik menggunakan Paired sample t-test. Hasil menunjukkan rata-rata tekanan darah sistolik dan diastolik sebelum intervensi adalah 152,25 mmHg dan 95,25 mmHg. Setelah dilakukan intervensi rata-rata tekanan darah sistolik dan diastolik adalah 135,15 mmHg dan 81,50 mmHg, p-value 0,001 yang berarti ada pengaruh pemberian black garlic terhadap penurunan tekanan darah pada pasien hipertensi yang tidak terkontrol. Pemberian black garlic menghambat aktivitas angiotensin-converting enzymes, khususnya angiotensin II sehingga meningkatkan relaksasi pembuluh darah yang selanjutnya dapat menurunkan tekanan darah.

Kata kunci: bawang putih hitam; tekanan darah; hipertensi yang tidak terkontrol



INTRODUCTION

Hypertension is a severe health problem with symptoms that are often not realized and pose a death threat. The incidence of hypertension is increasing from time to time (Mills et al, 2016). According to the data of the Indonesia Sample Registration System (2014), hypertension with complications is the 5th leading cause of death for all ages in Indonesia. The prevalence of hypertension in Indonesia is 26.5 percent. Of this number, ironically, only 1/3 of the total patients are diagnosed and the remaining 2/3 of the total patients are undiagnosed. Only 0.7% of diagnosed hypertension patients have taken medication. This finding shows that most hypertension patients are not aware of having hypertension or are unknowledgeable about the treatment.

Hypertension management can be pharmacological or non-pharmacological. Pharmacological management has side effects when used for a long time, while non-pharmacological management has far fewer side effects because it uses natural ingredients in the form of medicinal plants, better known as herbal medicines. Herbal medicines are considered safer than synthetic chemical drugs, more affordable, obtainable, and have relatively few side effects. One of the herbal ingredients that can be used to lower blood pressure is garlic, which is processed into a separate herbal product, namely black garlic (Setyawan & Muflihatin, 2019; Salsabila & Busman, 2021).

Black garlic contains flavonoid compounds that have anti-hypertensive effects by inhibiting the activity of the angiotensin-converting enzyme (ACE) and reducing oxidative stress, thereby increasing the relaxation of blood vessel endothelium, which in turn can reduce blood pressure. Black garlic also contains polyphenolic compounds that are useful in preventing cardiovascular diseases such as hypertension as well as lowering sugar levels. This is reinforced by Agustina's research (2020), which stated that black garlic has 5 times more Trolox Equivalent Antioxidant content than garlic. It is, therefore, useful for treating hypertension.

Along the same lines, Setyawan & Muflihatin (2019) found that black garlic is effective in lowering systolic and diastolic blood pressure in people with hypertension.

Black garlic is highly recommended for lowering high blood pressure in people with uncontrolled hypertension and reducing the risk of heart disease. With black garlic, it will reduce central blood pressure, total vascular resistance, and arterial stiffness in patients with uncontrolled hypertension so that blood pressure decreases. Black garlic is also safe for consumption as anti-hypertensive without doctor's therapy or consumed together with anti-hypertension drugs given by a doctor (Ried et al, 2016).

Based on the studies in Posbindu PTM Bendogerit conducted on 150 people, we found 45 people had hypertension. Of the hypertension patients, 20 patients had not previously identified hypertension and did not know if had hypertension. The hypertension patients, if they are sick not to come to the Primary Health Care and prefer to take herbal or natural medicine. Based on these findings, this study was conducted to investigate the effect of black garlic on reducing blood pressure in uncontrolled hypertensive patients.

METHOD

The research design used is a pre-experimental one-group pretest and posttest design. Sampling used a purposive sampling technique with a sample size of 20 respondents with inclusion criteria of patients newly detected with hypertension aged < 60 years in Posbindu-PTM, Bendogerit Village, Blitar City, and patients who had not received previous hypertension treatment.

The implementation of the study started by asking for the respondent's approval then measuring blood pressure (pretest) then giving black garlic to be consumed by the respondent 2 times a day as much as 2 grains each meal was given for 7 days. After 7 days, the blood pressure was measured again to determine the decrease in the respondent's blood pressure. After completing the data collection, univariate

analysis was carried out to describe the mean and standard deviation, while determining the effect of giving black garlic on lowering blood pressure using the Paired Sample t-test statistical test.

RESULT

Based on the characteristics of the respondents in table 1, 70% of the 20 respondents (14 people) are female, and 60% (12 people) are 50-59 years old.

Table 1. Characteristics of Hypertension Respondents in Posbindu-PTM, Bendogerit Village, Blitar City (n=20)

Characteristics	n=20	%
Age	35-39 years	2
	40-44 years	1
	45-49 years	5
	50-54 years	6
	55-59 years	6
Gender	Male	6
	Female	14

Table 2 shows the mean (mean) systolic blood pressure before being given black garlic was 152.25 mmHg with a standard deviation of 10.939. While the average (mean systolic blood pressure after being given black garlic was 135.15 mmHg with a standard deviation of 12.625. The p-value was 0.000 (there was a difference in systolic blood pressure before and after being given black garlic).

Table 2. Systolic Blood Pressure of Respondents Pre-test and Post-test being given Black Garlic at Posbindu-PTM, Bendogerit Village, Blitar City

Blood Pressure	Mean	Std. Deviasi	Mean Different	p-value
Systolic blood pressure (pre-test)	152,25	10,939	17,1	
Systolic blood pressure (post-test)	135,15	12,625		0,000

Table 3 shows the mean (mean) diastolic blood pressure before being given black garlic was 95.25 mmHg with a standard deviation of 4.723. While the average (mean diastolic blood pressure after being given black garlic is 81.50 mmHg with a standard deviation of 8.444. The p-value is 0.000 (there is a difference in diastolic blood pressure before and after being given black garlic).

Table 3. Diastolic Blood Pressure of Respondents Pre-test and Post-test being given Black Garlic at Posbindu-PTM Bendogerit Village, Blitar City

Blood Pressure	Mean	Std.Deviasi	Mean Different	p-value
Diastolic blood pressure (pre-test)	95,25	4,723	13,75	0,000
Diastolic blood pressure (post-test)	81,50	8,444		

DISCUSSION

The results of this study revealed differences in systolic and diastolic blood pressure in uncontrolled hypertensive patients before and after using black garlic. These results are in accordance with the study of Ried et al (2016) which stated that extracted black garlic was very strong in lowering blood pressure in uncontrolled hypertension patients compared to placebo. Ried et al (2016) also found that giving black garlic twice a day as much as 1,2 grams for 12 weeks was able to reduce SBP by more than 5 mmHg and DBP by more than 3 mmHg. This lowers blood pressure because produced polysulfides by black garlic influence BP through the nitric oxide pathway and hydrogen sulfide.

In this study, black garlic lowers blood pressure because it contains flavonoid compounds that have antihypertensive properties by inhibiting the activity of the angiotensin-converting enzyme (ACE) in the renin-angiotensin-aldosterone system. In the renin-angiotensin-aldosterone system, renin produced in the kidneys will be converted into angiotensin 1 (having a mild vasoconstrictor property), which will then be converted again into angiotensin 2 (having a very strong vasoconstrictor property and affecting circulation) by angiotensin-converting enzyme (ACE). With the provision of black garlic, angiotensin 1 is not converted into angiotensin 2 so that blood vessels experience vasodilation and blood pressure can be lowered (Guyton & Hall, 2018; Reid & Fakler, 2014).

Black garlic also contains S-allyl-cysteine sulfoxide (SAC), which shows high antioxidant activity to prevent the oxidation process due to free radicals and forestall the activity of the angiotensin-converting enzyme, by increasing the relaxation of blood vessels and lowering blood pressure. In addition, the mechanism of lowering blood pressure with the use of black garlic can be through nitric oxide (NO). NO, which is synthesized from the amino acid L-arginine, will induce the relaxation of blood vessel muscles, thereby increasing vasodilation of blood vessels, which ultimately results in a

decrease in blood pressure (Reid & Fakler, 2014; Kravchuk et al, 2021).

The results above are strengthened by Widiyari (2018), who figured out that flavonoid compounds have antihypertensive effects by having the ability to reduce oxidative stress, inhibit angiotensin-converting enzyme (ACE) activity, increase vascular endothelium relaxation, reduce insulin resistance, increase insulin sensitivity, and improve pancreatic beta cells that are useful for cleaning free radicals to prevent complications of hypertension. Choi et al (2014) also found that the antioxidant content in black garlic increased. This increase was found in the polyphenol content that reached 58.43 mg GAE/g, which is larger than the polyphenol content of garlic (13.91 mg GAE/g). The mechanism of polyphenols to prevent cardiovascular diseases such as hypertension is to act as an antidote to free radicals and reduce sugar levels one of the risk factors for hypertension. Black garlic prevents cardiovascular disease by reducing total peripheral resistance, arterial stiffness, central pulse pressure, and mean arterial pressure so that there is the reduction of the diameter of the lumen arterial and arteriosclerosis (Ried et al, 2016; Chen et al, 2021)

CONCLUSION

There is a decrease in blood pressure of uncontrolled hypertensive patients before and after administration of black garlic because black garlic contains flavonoid compounds, Nitric Oxide, and S-allyl-cysteine sulfoxide (SAC) which inhibits the production of Angiotensin II as a strong vasoconstrictor of blood vessels thereby increasing relaxation and vasodilation of blood vessels which ultimately lower blood pressure. The author would like to thank Posbindu-PTM Cadre of Bendogerit Village, Blitar, East Java, Indonesia for facilitating this review.

REFERENCES

- Agustina, E., Andiarna, F., & Hidayati, I. (2020). Uji aktivitas antioksidan ekstrak bawang hitam (black garlic) dengan variasi lama

- pemanasan. Al-Kauniyah: Jurnal Biologi, 13(1), 39–50.
<https://doi.org/10.15408/kauniyah.v13i1.12114>
- Chen, Chun-Yu.; Tsai, Tsung-Yu.; Chen, Bing-Huei. (2021). Effects of Black Garlic Extract and Nanoemulsion on the Deoxy Corticosterone Acetate-Salt Induced Hypertension and Its Associated Mild Cognitive Impairment in Rats. *Antioxidants*, 10, 2-21. DOI: <https://doi.org/10.3390/antiox10101611>
- Choi, I. S., Cha, H. S., & Lee, Y. S. (2014). Physicochemical and Antioxidant Properties of Black Garlic. *Molecules*, 19 (10), 16811-16823.
<https://doi.org/10.3390/MOLECULES191016811>
- Global Health Data Exchange. (2014). Indonesia Sample Registration System.
<https://ghdx.healthdata.org/record/indonesia-sample-registration-system-deaths-2014>
- Hall, John.E. (2018). Guyton dan Hall: Buku Ajar Fisiologi Kedokteran. Elsevier: Singapura
- Kravchuk, Olexandr.K.; Goshovsha, Yulia.V.; Korkach, Yulia. P.; Sagach, Vadym.F.(2021). Garlic Supplement Lowers Blood Pressure in 40-60 years old Hypertensive Individuals, Regulates Oxidative Stress, Plasma Cholesterol and Protombin Index. *Journal of Cardiovascular Medicine and Cardiology*, 8(2), 041-047. DOI: <https://dx.doi.org/10.17352/2455-2976.000168>
- Mills, K. T., Bundy, J. D., Kelly, T. N., Reed, J. E., Kearney, P. M., Reynolds, K., Chen, J., & He, J. (2016). Global Disparities of Hypertension Prevalence and Control: A Systematic Analysis of Population-Based Studies From 90 Countries. *Circulation*, 134(6), 441–450.
<https://doi.org/10.1161/CIRCULATIONAHA.115.018912>
- Ried, Karin & Fakler, Peter. (2014). Potential of garlic (*Allium sativum*) in lowering high blood pressure: mechanisms of action and clinical relevance. *Integrated Blood Pressure Control*, 7, 71-78.
DOI: [10.2147/IBPC.S51434](https://doi.org/10.2147/IBPC.S51434)
- Ried, Karin.; Travica, Nikolaj.; Sali, Avni. (2016). The effect of aged garlic extract on blood pressure and other cardiovascular risk factors in uncontrolled hypertensives: the AGEat Heart trial. *Integrated Blood Pressure Control*, 9, 9-21. DOI: <http://dx.doi.org/10.2147/IBPC.S93335>
- Salsabila, Qotrunnada & Busman, Hendri. (2021). Aktivitas Anti-Inflamasi Bawang Hitam (*Allium Sativum* L). *Jurnal Ilmiah Kesehatan Sandi Husada*, 10(1), 41-47.
DOI:<https://doi.org/10.35816/jiskh.v10i1.502>
- Setyawan, Annaas. B & Muflihatin, Siti. K. (2019). Efektivitas Black Garlic untuk Menurunkan Tekanan Darah pada Pasien Hipertensi. *Media Ilmu Kesehatan*, 8(2), 1260132.
DOI: <https://doi.org/10.30989/mik.v8i2.304>
- Widiasari, Santi. (2018). Mekanisme Inhibisi Angiotensin Converting Enzym oleh Flavonoid pada Hipertensi. *Collaborative Medical Journal (CMJ)*, 1(2), 30–44.
<http://jurnal.univrab.ac.id/index.php/cmj/article/view/474>