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The Effect Of Boiled Garlic Water On Reducing Blood Pressure In Hypertension Patients In The Area Of Kampung Curug RT 04 RW 04 Pakansari District, Bogor Regency

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ABSTRACT
Hypertension is an abnormal increase in blood pressure. This occurs when arterioles contract. Arteriolar contraction makes blood flow difficult and increases pressure against the artery walls. Single garlic contains compounds such as allicin and hydrogen sulfide, which effectively break down blood clots in the arteries, thereby reducing blood pressure. This study aims to analyze the effect of boiled garlic water on lowering blood pressure in hypertensive patients in the RT 04 RW 04 Pakansari Village area. The research design uses a quasi-experimental method with a Non-randomized pretest and posttest without a control design. The sample size in this study is 24 respondents. The sampling technique used is purposive sampling. The instruments in this study are 4 grams of single garlic, 250 ml of warm water, a blender, a Sphygmomanometer, and a stethoscope. The statistical test used is paired T-test with the research results showing a significant effect on lowering blood pressure in hypertensive patients after being given boiled single garlic water with a p-value of 0.000. This indicates the influence of boiled garlic water on lowering blood pressure in hypertensive patients, and it is hoped that in the future, the results of this study can be used as one of the non-pharmacological therapies for grade I and grade II hypertensive patients.

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INTRODUCTION

Hypertension is an abnormal increase in blood pressure in the arteries over a sustained period. This occurs when arterioles contract. Arteriolar contraction makes blood flow difficult and increases pressure against the artery walls. Hypertension increases the workload of the heart and arteries, which, if continued, can lead to heart and blood vessel damage[1]. Hypertension does not present specific complaints and symptoms, so many patients are unaware of it, which is why hypertension is dubbed the silent killer[2].

Hypertension, or high blood pressure, is a chronic condition where the blood pressure on the walls of the arteries (clean blood vessels) increases. Hypertension is associated with risk factors such as age, gender, education level, occupation, place of residence, smoking behavior, alcohol consumption, consumption of fruits and vegetables, consumption of

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caffeinated foods, and physical activity [3]. Uncontrolled hypertension can increase the likelihood of stroke, Congestive Heart Failure (CHF), and a three-fold increase in heart attacks. The prevalence of hypertension increases yearly in Indonesia and worldwide[4].

According to WHO (2021), 26.4% of the world's population suffers from hypertension, and this is expected to increase to 29.2% by 2025. The prevalence of hypertension in Southeast Asia ranks third highest in the world at 25% of the total population. Based on the Basic Health Research (Riskesdas) conducted by the Ministry of Health [5], hypertension in Indonesia is 34.11%, which is higher than in 2013 at 25.8%. West Java ranks second with the highest prevalence in Indonesia at 39.6%. The cities/districts with the highest prevalence in West Java are Sumedang District at 12.74%, Depok City at 10.9%, and Cirebon City at 8.57%. Based on the results of Riskesdas 2018, the prevalence of hypertension in Bogor District for those aged ≥ 18 years (ever diagnosed by a doctor) is 8.4% nationally.

According to WHO[6], of all hypertensive patients worldwide, less than one-fifth make efforts to control their blood pressure. Hypertension control aims to prevent and reduce the probability of illness, complications, and death. These measures can be grouped into pharmacological and non-pharmacological approaches. Pharmacological approaches involve treatment efforts to control the blood pressure of hypertensive patients, which can start from primary health care services such as health centers or clinics[3].

Pharmacological therapy starts with single drugs that have a long duration of action so that they can be given once daily and their dosage titrated. Additional drugs can be added during the first few months of therapy. Regarding medication adherence, most hypertensive patients regularly take their medication, accounting for 54.4%. Meanwhile, the population who do not regularly take medication and those who do not take medication at all account for 32.27% and 13.33%, respectively. Hypertension treatment is long-term, possibly lifelong[3]. Non-pharmacological therapy, according to some experts, is as essential as pharmacological treatment and may even be more beneficial, especially for patients with mild hypertension. In patients with mild hypertension, non-pharmacological treatment can sometimes control or reduce blood pressure, making pharmacological treatment unnecessary or at least delayed. However, in cases where antihypertensive drugs are strongly needed, non-pharmacological treatment can be complementary, resulting in better treatment outcomes[7][8].

Some herbal or non-pharmacological remedies for hypertension include celery leaves, cucumber, young coconut water, and garlic, which can treat hypertension[4]. The public increasingly prefers using herbs to treat diseases because they have been proven to provide satisfactory results. WHO recommends using herbal medicine in public health maintenance, disease prevention, and treatment, especially for chronic, degenerative, and cancerous diseases. WHO also supports efforts to improve the safety and efficacy of traditional medicine. The use of traditional medicine is generally considered safer than modern medicine. This is because traditional medicine has relatively fewer side effects than modern medicine.

Single garlic can lower blood pressure because it contains allicin and hydrogen sulfide. These substances have effects similar to antihypertensive drugs by enlarging blood vessels and making them less rigid, thereby reducing blood pressure. The mechanism of garlic in

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lowering blood pressure is related to vasodilation (widening) of blood vessels, which causes the closure and opening of channels, resulting in hyperpolarization. As a result, the muscles relax, and the high concentration of intracellular ions causes vasoconstriction, which affects the occurrence of hypertension. Allicin compounds contained in garlic are effective in breaking blood clots in arteries, reducing symptoms of diabetes, and lowering blood pressure[9].

Based on the study by Mohanis 2015 conducted at the Elderly Posyandu RW 01 Surau Gadang Village on February 19-26, 2014. The population consisted of 70 people, with a sample of 15 hypertensive elderly. The study's results found the average systolic blood pressure before and after the administration of garlic infusion to be 165.33±9.9 mmHg and 154±9.1 mmHg, t-value 12.588. The average diastolic blood pressure before and after the administration of garlic infusion was 96.66±16.858 mmHg and 94±12.98 mmHg, t-value 14.492. There was a significant difference in systolic and diastolic blood pressure before and after the administration of garlic infusion.

Based on the related research by Izzati & Luthfiana[4], respondents drank garlic boiling water for one week, with daily frequency, there was a difference in the average blood pressure values before and after the intervention. After the intervention, the average blood pressure value (P=0.000) was significantly meaningful, indicating that garlic boiling water affects blood pressure in hypertensive patients in the Tigo Baleh Bukittinggi Health Center work area.

In the preliminary findings conducted in the Curug Village area RT 04 RW 04 Pakansari Village, Bogor District, data were obtained from 24 individuals who suffered from hypertension in the last three months based on data from the Cibinong Health Center. On April 2, 2022, the researchers studied ten hypertensive individuals. Through interviews, it was found that one person mentioned their treatment by consuming boiled bay leaves and reducing foods containing salt or salted fish. Two others consumed antihypertensive drugs prescribed by a doctor after treatment and only took them when experiencing dizziness. The rest, namely seven hypertensive patients, did not regularly consume antihypertensive drugs due to fear of the side effects and also rarely visited the nearest health center/clinic for check-ups. It was also found that the efforts to lower blood pressure so far have only been by reducing salt intake and avoiding high-cholesterol foods. Most residents have never heard that consuming boiled garlic water can lower blood pressure. Therefore, there are increasing cases of hypertension among the population.

METHOD

This research method uses a quasi-experimental design with a pre-post test without a control group design. It is called a quasi-experiment because this experiment still needs to have the characteristics of a proper experimental design, as the variables that should be controlled or manipulated cannot be or are challenging to do so[10]. Quasi-Experiment is a study to determine whether there is a change or not in a condition that is strictly controlled, given treatment in certain conditions, and this is what is done in experimental research. The purpose of Quasi-Experimental studies is usually to evaluate interventions without using

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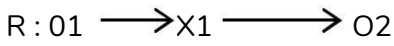
randomization[11]. The research design used in this study is quasi-experimental with a pre-post test without a control group design. This research was conducted by giving the experimental group an intervention in boiled garlic water. In this group, a Pre-test is conducted before the intervention and a post-test after the treatment by measuring blood pressure. The following is the scheme for pre- and Post tests without control group design:



Scheme 1. Research Design On The Effect Of Giving Boiled Water

The research population consists of 24 hypertensive individuals in the Curug Village, RT 04 RW 04, Pakansari Subdistrict, Bogor Regency, and the sample also consists of 24 individuals selected using a total sampling technique, so all members of the population are included in the study. The research is conducted by providing an intervention by giving boiled garlic water to the experimental group. The data collection process is done through a preliminary survey, initial data collection, research proposal preparation, intervention implementation, and research report preparation. The intervention is carried out for seven days. The research instruments used in this study are:

a. Instrument for Making Boiled Garlic Water: The equipment used is 4 grams of garlic, a blender to blend the garlic until smooth, 250 cc of water, strain the garlic water, and drink the resulting juice once a day for 200 cc of garlic water.
b. Instrument for Blood Pressure Measurement: The equipment used is a calibrated Sphygmomanometer or tensiometer, a stethoscope, and an observation sheet.

In the research ethics stage, research approval, confidentiality, anonymity, honesty, objectivity, integrity, and accuracy are applied to protect respondents and research integrity. The data collection tool used is the instrument for making boiled garlic water and the instrument for blood pressure measurement. The data collection process is divided into administrative and technical procedures. The administrative procedure of this research involves obtaining permission from the chairman of STIKES PERTAMEDIKA and the head of RT 04 Curug Village as the initial step.

In the research ethics stage, research approval, confidentiality, anonymity, honesty, objectivity, integrity, and accuracy are applied to protect respondents and research integrity. The data collection tool used is the instrument for making boiled garlic water and the instrument for blood pressure measurement. The data collection process is divided into administrative and technical procedures. The administrative procedure of this research involves obtaining permission from the chairman of STIKES PERTAMEDIKA and the head of RT 04 Curug Village as the initial step.

After obtaining approval, the researcher makes a time contract with the cadres to conduct the research in the Curug Village, RT 04 RW 04, Pakansari Subdistrict, Bogor Regency. Meanwhile, the research's technical procedure begins with a preliminary study and interviews with hypertensive residents in the area. After obtaining consent, the researcher

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and assistants conduct blood pressure checks before giving the intervention. Next, the researcher explains the purpose of the research to the potential respondents and asks them to sign the informed consent. After obtaining consent, the researcher prepares boiled garlic water and gives it to the respondents for seven days. Blood pressure measurements are taken after the intervention during this period. After the data is collected, data processing and analysis are conducted to evaluate the effect of the intervention on the respondents' blood pressure. Data processing includes editing, coding, data entry, and cleaning. Data analysis includes a normality test, univariate analysis (mean and standard deviation), frequency distribution, and bivariate analysis (paired T-test).

RESULTS AND DISCUSSION

Univariate Results

This chapter will explain research on the Effect of Boiled Garlic Water on Reducing Blood Pressure in Hypertension Sufferers in the Kampung Curug Area RT 04 RW 04 Pakansari Village, Bogor Regency, which was carried out June 10 to July 10 2022.

Table 1. Blood Pressure Before (Pre) Giving Boiled Garlic Water to Hypertension Sufferers

(n=24)

Blood pressure	Mean	elementary school	Min-Max
Systole	154.17	18,631	130-200
Diastole	102.92	11,221	90-130

Table 1 shows that before administering boiled garlic water, data obtained on the average systolic blood pressure were 154.17 mmHg, with a minimum value of 130 and a maximum of 200 and a standard deviation of 18.631, and the average diastolic blood pressure was 102.92 mmHg, with a minimum value of 90 and a maximum value of 130 and a standard deviation of 11.221.

Table 2. Blood Pressure After (Post) Giving Boiled Garlic Water to Hypertension Sufferers

(n=24)

Blood pressure	Mean	elementary school	Min-Max
Systole	138.75	19,630	130-200
Diastole	94.58	8,330	90-130

Table 2 shows that after giving boiled garlic water to hypertension sufferers for seven days, the average systolic blood pressure data was 138.75 mmHg with a minimum value of 130 and a maximum of 200 with a standard deviation of 10.033 and the average diastolic blood pressure was 94.58 mmHg with a minimum value of 90 and a maximum of 130 with a standard deviation of 8.330.

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Following are the results of the difference in average blood pressure in hypertensive patients before and after being given boiled garlic water for a week, which can be seen in table 3 as follows:

Table 3. Difference in Average Blood Pressure Before (Pre) and After (Post) Given Garlic Boiled Water to Hypertension Sufferers
(n=24)

Blood pressure	Mean Pre	Mean Post	Difference Results
Systole	154.17	138.75	15,417
Diastole	102.92	94.58	8,333

Table 3 shows the difference in average blood pressure before and after administering boiled garlic water to hypertension sufferers. Diastolic blood pressure was 8.333 mmHg with a minimum value of 5.949 and a maximum of 10,718 with a standard deviation of 8.330.

Bivariate Analysis

Bivariate analysis aims to see the direct influence between the independent and dependent variables. The effect of boiled garlic water on reducing blood pressure in hypertension sufferers in the Kampung Curug area RT 04 RW 04, Pakansari Village, Bogor Regency. Bivariate analysis was used to test the effect of boiled garlic water on reducing blood pressure in hypertension sufferers in the Kampung Curug area RT 04 RW 04 Pakansari Village, Bogor Regency. To determine the effect of boiled garlic water on reducing blood pressure in hypertension sufferers, the Paired-Samples T Test (Dependent T-Test) statistical test is used, with the following conditions: There is a significant effect if the p-value is <0.05 and not significant if p-value >0.05.

Table 4. The Effect of Boiled Garlic Water on Reducing Blood Pressure in Hypertension Sufferers Before (Pre) and After (Post)
(n=24)

Blood Pressure Before & After	Mean	MIN-MAX	elementary school	SD Error	P. Value
Systole	15,417	13,267-17,566	5,090	1,039	0,000
Diastole	8,333	5,949-10,718	5,647	1,153	

Table 4 shows that the results of the analysis of the effect of giving boiled garlic water on reducing blood pressure in hypertension sufferers obtained a p-value of 0.000 ($p < 0.05$), so Ha is accepted, meaning that there is an effect of giving boiled garlic water on reducing blood pressure in hypertension sufferers. In the Kampung Curug area RT 04 RW 04 Pakansari Village, Bogor Regency, with the effect of reducing systolic blood pressure by 15,417 mmHg and diastolic blood pressure by 8,333 mmHg.

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Discussion

Univariate Analysis Results

Average Blood Pressure Before Giving Boiled Garlic Water. Blood pressure before the intervention of boiled garlic water: The study's results showed that respondents had an average systolic blood pressure of 154.17 mmHg and an average diastolic blood pressure of 102.92 mmHg. This aligns with Rahayuningrum and Herlina research entitled The Effect of Giving Garlic Juice (Allium Sativum) on Blood Pressure in Hypertension Sufferers[12]. There were 16 respondents in the garlic juice group in the garlic juice research. Where the blood pressure of the respondents before the intervention was given was an average systolic of 152.88 mmHg and an average diastolic of 101.25 mmHg. Then this is also in line with research conducted by Hevtidayah[13] and Kafil, Ropi, and Rahayu[14], there were ten respondents in the garlic steeping water group in the garlic steeping water research. The blood pressure of respondents before the intervention was given was an average systolic of 153.94 mmHg and an average diastolic of 91.56 mmHg. This is relatively high because the intervention did not provide boiled water for a single garlic.

According to Syamsudin[15], hypertension can be defined as persistent blood pressure where the systolic pressure is above 140 mmHg and the diastolic pressure is above 90 mmHg and is usually accompanied by symptoms such as headaches, heaviness in the nape of the neck, difficulty sleeping and blurred vision. According to the seventh report of the joint national committee. (JNC7) classification of hypertension is divided into grade 1 systole (140-159 mmHg) diastole (90-99mmHg), grade 2 systole (≥160mmHg) diastole (≥100mmHg). According to Elsanti[16], the causes of hypertension include genetics, age, consuming excess salt, smoking and stress. The researcher's analysis of the respondents' eating patterns showed that they consumed many foods containing excess salt, such as salted fish, and some respondents were still accustomed to the smoking lifestyle. Apart from that, the age factor also influences the cardiovascular system, which begins to decline as we get older. If high blood pressure remains for an extended period, it can cause several complications, such as heart failure and stroke.

Average Blood Pressure After Being Given Boiled Garlic Water.

Blood pressure after the intervention of giving single onion brewed water, the results of the study showed that respondents had an average systolic blood pressure of 138.75 mmHg and an average diastolic blood pressure of 94.58 mmHg. This aligns with Fitria and Setianti [17] research titled Benefits of Garlic Stewed Water for Reducing Hypertension. The study's results explained that of the 15 respondents' systolic blood pressure, all respondents experienced a decrease. The average systolic blood pressure value before treatment was 173.33 and after treatment 145.33. Thus, there was a decrease in blood pressure of 28.0. Then this is also in line with research conducted by Rahayuningrum and Herlina[12] entitled The Effect of Giving Garlic Juice (Allium Sativum) on Blood Pressure in Hypertension Sufferers. There were 16 respondents in the garlic juice group in the garlic juice research. The blood pressure of respondents after the intervention was an average systolic of 144.25 mmHg and an average diastolic of 91.88 mmHg.

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Corwin[18] explained that untreated Hypertension will cause complications such as heart failure, stroke, kidney failure and vision damage. Hypertension management is divided into two ways, namely pharmacological and non-pharmacological management. Pharmacological management involves consuming anti-hypertension drugs such as diuretics, beta-blockers, and ACE inhibitors[19]. Non-pharmacological management uses a low-salt diet, exercise, and consuming fruit and vegetables[20]

The researchers' analysis shows that high blood pressure can be controlled with non-pharmacological therapy, namely single garlic, which is processed into boiled garlic water and drunk regularly every morning before breakfast. The allicin content in single garlic is very influential in lowering blood pressure. Apart from that, single garlic is also easy for respondents to get.

Bivariate Analysis

The results of statistical tests using the Paired T-test obtained a value (p = 0.000), meaning that there was an effect of giving single garlic boiled water on and Reducing Blood Pressure in Hypertension Sufferers in the Kampung Curug Area RT 04 RW 04 Pakansari Village, Bogor Regency. The results of this research are the same as research conducted by Izzati and Luthfiani [4] with the title The Effect of Giving Boiled Garlic Water on Blood Pressure in Hypertension Patients in the Working Area of the Tigo Baleh Health Center, Bukit Tinggi City, which shows that after the intervention there was a decrease in pressure. blood significantly (p=0.000).

Hypertension or high blood pressure is a chronic condition in which blood pressure on the walls of the arteries (clean blood vessels) increases. Uncontrolled hypertension can increase the chance of cardiovascular disease, including stroke, Congestive Heart Failure (CHF) and 3 times greater risk of heart attack. Hypertension is not a disease caused by a single causal factor, but many factors influence blood pressure, including heredity, gender, age, smoking, alcohol consumption, stress and sodium intake. Hereditary factors play a role in the emergence of hypertension, someone who has parents who have hypertension, then those parents are at risk for hypertension.

According to Untari's research presentation[21], single garlic is also useful for lowering cholesterol levels. This is because single garlic has ajoene contained in it, which is a compound that has anti-cholesterol properties and helps prevent blood clots. There is also research that finds that consuming garlic regularly, around 1-2 cloves every day, can help prevent heart attacks. This is because garlic is useful in helping reduce blockages in the heart arteries, thereby minimizing the occurrence of heart attacks. 100 grams of single garlic has a chemical content consisting of 1.5% Allicin, which is an important component in antibiotic effects, 4.5 grams of protein, 0.2 grams of fat, 23.10 grams of charcoal hydrate, 0.22 milligrams of Vitamin B1, Vitamin C 15 milligrams, calories 95 calories, phosphorus 134 milligrams, calcium 42 milligrams, iron 1 milligram, water 71 grams.

The mechanism of action of garlic in lowering blood pressure is related to the effect of vasodilation (widening) of blood vessels which causes the channels to close and the channels to open, resulting in hyperpolarization. In this way, the muscles will experience relaxation, the

high concentration of intracellular ions causes vasoconstriction which has an impact on the occurrence of hypertension. The allicin compound contained in garlic is efficacious in destroying blood clots in the arteries, reducing symptoms of diabetes and reducing blood pressure [9]. The researchers' analysis of lowering blood pressure occurs because single garlic contains allicin and hydrogen sulfide which function to enlarge blood vessels and make blood vessels less stiff, so blood pressure will decrease. Provide education to respondents to change their lifestyle patterns, reduce consumption of excess salt and high cholesterol, reduce smoking habits, and frequently engage in activities such as exercising.

CONCLUSION

Based on the results of the research and discussion regarding the effects before and after the intervention of giving boiled garlic water to hypertension sufferers in the Kampung Curug area RT 04 RW 04, Pakansari Village, Bogor Regency, the researchers can conclude that: Before the intervention, respondents had an average systolic blood pressure of 154.17 mmHg and diastolic 102.92 mmHg in hypertension sufferers in the Kampung Curug area RT 04 RW 04 Pakansari Village, Bogor Regency. After the intervention, respondents had an average blood pressure of systolic 138.75 mmHg and diastolic 94.58 mmHg in hypertension sufferers in the Kampung Curug area RT 04 RW 04 Pakansari Village, Bogor Regency. The difference in blood pressure after and before with the difference in decreasing systolic blood pressure of 15,417 mmHg and diastolic blood pressure of 8,333 mmHg in hypertension sufferers in the Kampung Curug area RT 04 RW 04 Pakansari Village, Bogor Regency. There is an effect of giving boiled garlic water alone on hypertension sufferers in the Kampung Curug area RT 04 RW 04 Pakansari Village, Bogor Regency with results (p value=0.000).

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