


# The Effect Of Isometric Handgrip Exercise And Watermelon Juice On Reducing Blood Pressure In Hypertension Sufferers In The RT 07 RW 06 Pengasinan Sawangan Depok Area

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Article Info	ABSTRACT
<p><b>Keywords:</b> Isometric Handgrip exercise, Watermelon Juice, Hypertension</p>	<p>Hypertension is often called the silent killer because it generally has no signs and symptoms, so it is only discovered after it causes complications. One non-pharmacological therapy that can be given to reduce blood pressure in hypertensive patients is a combination of isometric handgrip exercise therapy and watermelon juice. This study aims to determine the effect of isometric handgrip exercise and watermelon juice on reducing blood pressure in hypertension sufferers. This research design uses a quasi-experiment with a pre-post-test research design without control. The population in this study was 45 people, with a sample size of 18 people. The results of this study show that there is an effect of isometric handgrip exercise and watermelon juice on reducing blood pressure in hypertension sufferers in the RT 07 RW 06 Pengasinan Sawangan Depok area with a p-value of 0.000 (<math>p &lt; 0.05</math>) on systolic blood pressure and a p-value of 0.000 (<math>p &lt; 0.000</math>) in diastolic blood pressure. It is hoped that the results of this research can be used as an alternative treatment to lower blood pressure in hypertension sufferers and can add information that the treatment of hypertension is not only with medication but can be supplemented with non-pharmacological therapy such as watermelon juice, and isometric handgrip exercise intervention can be an alternative patient activity that has an effect. Stable blood pressure can be maintained independently at home.</p>
<p>This is an open access article under the <a href="https://creativecommons.org/licenses/by-nc/4.0/">CC BY-NC</a> license</p> 	<p><b>Corresponding Author:</b> Ulfah Azmilia Sekolah Tinggi Ilmu Kesehatan Pertamedika, Jakarta, Indonesia <a href="mailto:azmilia31@gmail.com">azmilia31@gmail.com</a></p>

## INTRODUCTION

Hypertension is an increase in systolic blood pressure of more than 140mmHg and diastolic blood pressure of more than 90mmHg over a continuous period, based on the average of the results of two or more blood pressure measurements by health workers[1]. Primary hypertension is hypertension without an apparent underlying pathological disorder. More than 90% of cases are primary hypertension. The causes of primary hypertension include genetic factors, stress, lifestyle, and emotions [2] . It has signs and symptoms, so it is only discovered after complications arise. Signs and symptoms of hypertension include headaches, fatigue, nausea, vomiting, shortness of breath, anxiety, and blurred vision [3].

Based on data from the World Health Organization (WHO), the global prevalence of hypertension is currently 22% of the total world population. The highest prevalence of hypertension is in Africa, namely 25%. Southeast Asia ranks third highest, with a prevalence of 25% of the total population[4]. According to Riskesdas[5], the prevalence rate of hypertension based on measurement results in the population aged > 18 years in Indonesia is 34.1%. Based on a doctor's diagnosis, the highest is at age > 75 years.

There are more hypertension sufferers in women (36.9% compared to men (31.3%). Hypertension sufferers in West Java 2018 were 34.1%[6]. According to the Depok City Health Service 2016, measurements In 2016, 34,244 cases of hypertension were reported in patients aged <18 years out of 759,719 patients whose hypertension was measured.

Untreated hypertension can cause dangerous complications such as heart failure, stroke, kidney damage, and vision damage. Hypertension is a significant risk factor for cerebrovascular disease (stroke, transient ischemic attack), coronary artery disease (myocardial infarction, angina), kidney failure, dementia, and atrial fibrillation[7]. To prevent dangerous complications, proper hypertension treatment is needed. The aim of treating hypertension is to prevent morbidity and mortality due to high blood pressure[8].

Management of hypertension can be done pharmacologically and non-pharmacologically. Management of hypertension pharmacologically by administering diuretics (thiazide diuretics, loop diuretics), antiadrenergic (central antiadrenergic, peripheral antiadrenergic, alpha and beta blockers), vasodilators (ACE inhibitors, calcium channel blockers, and direct vasodilators). Meanwhile, non-pharmacological management of hypertension includes weight management, reducing salt intake, exercise, reducing alcohol consumption, and stopping smoking[9]. According to the Rahadiyanti, et al[10], research on dietary approaches to stop hypertension (DASH) shows that a diet high in vegetables, fruit, and dairy products, low in saturated fat and low in total fat, and high in potassium, calcium, and magnesium can reduce systolic pressure by 6-11mmHg. And diastolic blood pressure 3-6mmHg.

One fruit that can lower blood pressure is watermelon. Watermelon (*Citrullus vulgaris*) is a plant that originates from Africa and is proliferating in various tropical and subtropical countries such as South Africa, China, Japan, and Indonesia. Watermelon has a high water content of around 92% of its total weight. Watermelon is rich in flavonoids, including anticancer, antimicrobial, antiviral, anti-inflammatory, antithrombin, alkaloids, saponins, glycosides, tannins, and phenols. The nutritional content of watermelon is very beneficial for body health[11]. The flavonoids in watermelon juice work physiologically to secrete electrolytes, fluids and electrolytes, and toxic substances in the body. Body conditions that experience a reduction in salt, fluids, and electrolytes will cause blood vessels to dilate and loosen so that blood pressure decreases gradually[12].

Watermelon protects the heart, facilitates urine output, and maintains healthy skin. For people with hypertension, watermelon can be consumed to neutralize blood pressure, treat canker sores, cleanse the kidneys, and improve heart function[11]. Research conducted by Nurjannah [13] gave watermelon juice for seven days at a dose of 2 times 350

grams/glass/day with a p-value of 0.000. According to research conducted by Pardede et al [14] the average blood pressure results were obtained. The blood of the control group was presystolic 147.50 and diastolic 95.00, the control group posttest systolic 131.25 and diastolic 85.00. while the intervention group's pretest systolic was 147.50 and diastolic 95.00, and the intervention group's posttest systolic was 123.75 and diastolic 75.00 with a systolic p-value of 0.022 and diastolic 0.019, meaning that there was an influence on reducing blood pressure in hypertension sufferers. This research aligns with Umrah et al [15] the results showed that giving watermelon juice can reduce blood pressure in hypertensive sufferers with a p-value of 0.000.

Apart from watermelon juice, one of the exercises that can reduce hypertension is the isometric handgrip exercise. Isometric Handgrip Exercise is a static exercise therapy using a handgrip dynamometer that involves contracting muscle resistance without changing muscle length, for example, lifting or pushing heavy loads and contracting muscles against particular objects[16]. This isometric handgrip exercise can reduce cardiovascular reactivity to psychophysiological stressors in people with hypertension[17]. According to Manimala[18], this exercise has been proven to lower blood pressure and is also helpful in preventing muscle atrophy, building muscle volume, increasing joint stability, and reducing edema.

Based on research conducted by Prastiani et al[19], carry out isometric handgrip exercises with guidance from researchers based on the SOP. They are carried out for approximately 3 minutes and then repeated for five consecutive days. The average blood pressure of employees at Mitra Siaga Tegal Hospital before being given isometric handgrip exercise was in the grade 1 hypertension category with an average systolic blood pressure value of 149.58 mmHg and an average diastolic blood pressure value of 98.14 mmHg. The average blood pressure of employees at Mitra Siaga Tegal Hospital after being given isometric handgrip exercise was in the grade 1 hypertension category with an average systolic blood pressure value of 141.68 mmHg and an average diastolic blood pressure value of 90.66 mmHg. The analysis method used is the Wilcoxon sign rank test with a p-value of 0.000 (< 0.05), which means that the application of isometric handgrip exercise can reduce blood pressure in sufferers of grade 1 hypertension.

Based on the results of a preliminary study in the RT 07 RW 06 Pengasinan Sawangan Depok area, data was obtained from Posbindu Asoka with a diagnosis of hypertension from July-September 2023 as many as 45 respondents. Researchers conducted interviews with ten people who suffered from hypertension, with signs and symptoms such as dizziness in 3 people (30%), chest palpitations in 2 people (20%), difficulty sleeping in 3 people (30%), shortness of breath during activities, two people (20%). Respondents who have hypertension do not take antihypertensive medication regularly. The impact of uncontrolled hypertension will cause stroke. In the RT 07 RW 06 area, data was obtained from 1 respondent who suffered a stroke (10%). In RT 07 RW 06 Pengasinan Sawangan Depok, hypertension counseling has been carried out, as food diets for hypertension sufferers and Posbindu activities once a month. However, respondents do not know about the existence of watermelon juice therapy and isometric handgrip exercise to reduce blood pressure in

hypertension sufferers. In RT 07 RW 06 Pengasinan Sawangan area, Depok, there has been no research on watermelon juice and isometric handgrip exercise on reducing blood pressure in hypertension sufferers.

## METHOD

This research uses a quasi-experimental design, namely research with an experimental group [20]. It can be with or without a control group but is not carried out randomly (nonrandom assignment) because there are no strict restrictions on randomization [21]. The research design uses pre and post-tests without control. This design means the study has no control group, and the intervention is carried out in one group without a comparison. The effectiveness of the treatment is assessed by comparing the post-test and pre-test scores[22]. The scheme of this design can be described as follows:

R→O1→X1→O2

### Scheme 1. Pre And Post Test Without Control

The study's population was 45 individuals with hypertension who lived in the RT 07 RW 06 Pengasinan Sawangan Depok area. Hypertension sufferers in the RT 07 RW 06 Pengasinan Sawangan Depok area do not yet know that isometric handgrip exercises and watermelon juice can lower blood pressure. The research time is also called the research period[23]. This research was conducted from October 2023 to January 2024.

From the field study, 25 people suffered from hypertension and did not take medication. Samples were selected randomly or non-randomly before data collection[24]. According to Suryadi[25], the number of samples for experimental research can be determined using the Federer formula. From the calculation results, an r-value of 16 is obtained. Considering the possibility of a 10% drop-out, the sample size becomes 18 respondents.

This research uses a nonprobability sampling technique with a purposive sampling method. Purposive sampling is a non-random sampling technique that prioritizes the criteria and research objectives set by the researcher [24]. Inclusion criteria in this study included respondents who had never received isometric handgrips and watermelon juice, were willing to participate, had primary hypertension, and were non-compliant with hypertension medication. Meanwhile, exclusion criteria include respondents with mobility impairments, allergies to watermelon, rheumatoid arthritis, carpal tunnel syndrome, pain syndrome, hand arthritis, musculoskeletal injuries in the upper and lower extremities, hypertension complications such as stroke, diseases that are contraindicated to consuming watermelons such as prostate and stomach disease, unwilling to participate, and do not like watermelon.

This research follows the principles of research ethics, including beneficence, respect for human dignity, justice, and informed consent. The principle of beneficence is applied by explaining the benefits, objectives, and procedures of research to respondents and maintaining the confidentiality of respondents' identities. The principle of respect for human dignity is implemented by giving respondents the freedom to ask questions and decide to participate without coercion. The principle of justice was implemented by providing fair intervention to all respondents, which involved isometric handgrip exercises and consuming

watermelon juice every morning for seven days. After understanding the research's benefits, objectives, and procedures, respondents signed an agreement form as informed consent.

Researchers used several instruments: a respondent characteristics questionnaire for age and gender data, an observation sheet to record blood pressure before and after the intervention, a calibrated sphygmomanometer, equipment for isometric handgrip exercises, and materials and tools for making watermelon juice. Watermelon juice was made by mixing 350 grams of watermelon in a blender without water, then given to respondents twice a day before eating.

The data collection procedure begins with administrative preparation, including approval of the research proposal and submission of a research permit letter to STIKES PERTAMEDIKA and the local RT head. The researcher then selected a research assistant who understood technical procedures and had a bachelor's degree in nursing. Respondents were selected based on inclusion and exclusion criteria, and after receiving a complete explanation of the research, they signed informed consent. Blood pressure measurements were taken before the intervention, and for seven days, isometric handgrip exercises and administration of watermelon juice were carried out every morning and evening. Blood pressure is measured again on the eighth day, and the results are recorded for analysis.

Data processing begins with editing to ensure data completeness. Data were then coded based on age and gender categories and blood pressure results before and after the intervention. The coded data is entered into a computer program and then checked again to ensure no missing or erroneous data. After that, the data is categorized to facilitate analysis. Data analysis was carried out in the form of univariate and bivariate analysis. The normality test using skewness ensures that the data has a normal distribution, allowing parametric statistics[26].

Univariate analysis describes the characteristics of respondents, while bivariate analysis evaluates the relationship or influence between two variables. In this research, the paired T-test is used to test the difference in the average of two groups of dependent data, according to the criteria for data that is typically distributed and on a numerical scale. The results of the paired T-test will determine whether there is a significant effect of isometric handgrip training and watermelon juice on reducing blood pressure in hypertension sufferers in the RT 07 RW 06 Pengasinan Sawangan Depok area. Test decisions are based on p-value, where  $p\text{-value} \leq 0.05$  indicates a significant influence, while  $p\text{-value} > 0.05$  indicates no significant influence.

## RESULTS AND DISCUSSION

### Univariate Results

**Table 1.** Distribution of Respondents Based on Age

Age	Frequency	Percentage (%)
Early elderly age (46-55 years)	14	77.8
Late elderly (56-65 years)	4	22.2
Total	18	100

The results of this study showed that the majority of respondents were 46-55 years old, including 14 respondents (77.8%) in the early elderly age category. The results of this research are in line with research conducted by Sari et al. (2023) regarding the Effect of Giving Watermelon Juice Therapy on Reducing Hypertension in the Elderly, where respondents in this study were dominated by respondents aged 45-59 years with a percentage of 62.9% (17 respondents).

As a person's age increases, there will be a decrease in body function and endurance due to the aging process, which makes a person susceptible to disease, one of which is hypertension (Ministry of Health of the Republic of Indonesia, 2013 in Tamamilang, Grace, and Jeini, 2018). Hypertension will increase with increasing age, where after the age of 55 years, the condition of the arterial blood vessel walls will thicken due to the buildup of collagen substances in the muscle layer so that the blood vessels will become narrow and stiff[27]. According to the researchers' analysis, one of the risk factors for hypertension that cannot be modified is age. As you get older, your blood pressure also increases. This is due to changes in the physiological system of the blood vessels themselves, where the blood vessel walls thicken so that the blood vessels become inelastic.

**Table 2.** Distribution of Respondents Based on Gender

Gender	Frequency	Percentage (%)
Man	8	44.4
Woman	10	55.6
Total	18	100

The results of this study showed that the majority were women, with ten respondents (55.6%). The results of this study are in line with Sari et al[28] regarding the Effect of Giving Watermelon Juice Therapy on Reducing Hypertension in the Elderly, where the respondents in this study were female primary respondents, totaling 21 people (77.8%), while there were six male respondents (22.2%).

The risk factors for hypertension are divided into two factors, namely, factors that cannot be modified and risk factors that can be modified. One of the factors that cannot be modified is gender. Research conducted by Falah[29] shows that women tend to experience hypertension more than men. Women will experience an increased risk of hypertension after menopause. Namely, women over 45 years of age who experience menopause have low estrogen levels.

In contrast, this estrogen functions to increase high-density lipoprotein (HDL) levels, which play a significant role in maintaining healthy blood vessels. When estrogen and HDL levels decrease, this will result in atherosclerosis, which will increase blood pressure. Apart from hormonal reasons, obesity also causes women to suffer from hypertension more often[29]. According to researchers' analysis, women tend to be at high risk of developing hypertension due to their hormonal factors and the lack of daily physical activity they do. Both

of these things can be minimized by changing lifestyles, such as exercising and reducing the habit of consuming foods high in salt or salty foods, which cause hypertension.

**Table 3.** Average Blood Pressure Before Isometric Handgrip Exercise and Giving Watermelon Juice to Hypertension Sufferers

Pretest	Mean	Min	Max	elementary school
Systolic blood pressure	152.72	139	171	9,510
Diastolic blood pressure	89.72	72	100	7,379

The results of this study show that the average systolic blood pressure before the intervention was given was 152.72 mmHg with a standard deviation of 9.510, which is classified as grade 1 hypertension. In comparison, the average diastolic blood pressure before the intervention was 89.72 mmHg with a standard deviation of 7.379, which is classified as the grade 1 hypertension category. The results of this research are in line with research conducted by Prastiani et al[19] the average blood pressure of Mitra Siaga Tegal Hospital employees before being given isometric handgrip exercise had blood pressure in the grade 1 hypertension category with an average systolic blood pressure value of 149.58 mmHg, and the average diastolic blood pressure value was 98.14 mmHg. This is supported by research conducted by Nurjannah[13] showed an average systolic blood pressure of 172.67 mmHg with a minimum value of 150 mmHg, a maximum of 190 mmHg and a standard deviation of 14.376 and average diastolic blood pressure of 105.33 mmHg with a minimum value 90mmHg, maximum 120mmHg and standard deviation 10.601.

Hypertension can be defined as persistent high blood pressure where the systolic pressure is above 140 mmHg and the diastolic pressure is above 90 mmHg. Blood pressure is influenced by stroke volume and total peripheral resistance, where if an increase in one of these variables is not compensated for, it can cause hypertension[28]. According to Turana[30], the classification of hypertension is divided into several categories including normal (Systolic 120-129 mmHg, diastolic 80-84 mmHg), high average (systolic 130-139 mmHg and diastolic 85-89 mmHg), grade 1 hypertension (systolic 140- 159 mmHg and diastolic 90-99 mmHg), grade II hypertension (systolic 160-179 mmHg and diastolic 100-109 mmHg), grade 3 hypertension (systolic > 180 mmHg and diastolic > 110 mmHg).

Nervous and humoral mechanisms regulate blood pressure regulation. Among the neural mechanisms, blood pressure regulation is carried out by sympathetic nerves and vagus nerve activity. Stimulation of sympathetic nerve activity causes an increase in heart rate and heart contractility, which can increase blood pressure while stimulating the vagus nerve's effect on the heart, slowing heart rate and lowering blood pressure. Renin is a synthetic enzyme that is stored and released by the kidneys to overcome blood pressure imbalances[31].

This reninase plays a role in converting the angiotensin gene into angiotensin I. Angiotensin I is then converted into angiotensin II, which is produced by angiotensin-converting enzyme (ACE). Angiotensin II is an effective artery constrictor. This vasoconstriction response increases peripheral vascular resistance and increases blood

pressure. Apart from acting as a vasoconstrictor, angiotensin II also stimulates the adrenal glands to secrete aldosterone. Aldosterone can cause water and salt retention in the kidneys. The presence of water and salt retention increases blood volume and increases blood pressure[31]

Hypertension, if not treated properly, can cause several complications, namely myocardial infarction, arteriosclerosis, blindness, heart attack, heart failure, and kidney failure [32]. Apart from that, hypertension can cause bleeding in brain tissue caused by prolonged high pressure on the brain. Heart failure will also result in the heart's inability to pump blood normally, resulting in a large amount of fluid collecting in the lungs, legs, and other tissues, which is often called edema. High blood pressure can also cause an increase in capillary pressure and push fluid into the interstitial space throughout the central nerve so that the surrounding neurons collapse and cause coma[33]

According to the researchers' analysis, respondents in this study were not compliant with taking hypertension medication, still consumed salty foods, had unhealthy eating patterns such as consuming fast food, and lacked activity. This can trigger uncontrolled hypertension with symptoms of dizziness experienced by respondents.

**Table 4.** Average Blood Pressure After Isometric Handgrip Exercise and Giving Watermelon Juice to Hypertension Sufferers

Post test	Mean	Min	Max	elementary school
Systolic blood pressure	140.50	128	156	8,638
Diastolic blood pressure	80.33	70	89	4,433

The results of this study show that the average blood pressure after intervention for systolic was 140.50 mmHg with a standard deviation of 8.638, a minimum value of 128 mmHg, and a maximum value of 156 mmHg, while for diastolic, the average was 80.33 mmHg with a standard deviation of 4.433, a minimum value of 70 mmHg and maximum value 89 mmHg.

The results of this research are in line with research conducted by Prastiani et al[19], the average blood pressure of Mitra Siaga Tegal Hospital employees after being given isometric handgrip exercise had blood pressure in the grade 1 hypertension category with an average systolic blood pressure value of 141.68 mmHg, and the average diastolic blood pressure value was 90.66 mmHg. This is supported by research conducted by Nurjannah[13] showed an average systolic blood pressure of 148 mmHg with a minimum value of 130 mmHg, a maximum of 170 mmHg and a standard deviation of 13.202. The average diastolic blood pressure was 93.33 mmHg, with a minimum value of 80 mmHg, a maximum of 110 mmHg, and a standard deviation of 10.501.

Management for lowering blood pressure can be given pharmacologically in the form of anti-hypertension drugs and non-pharmacologically in the form of stopping smoking, doing physical activities such as isometric handgrip exercises, and adopting healthy eating behaviors such as consuming watermelon[34]



Isometric handgrip exercises are gripping exercises where contractions occur in the forearm and hand, causing changes in muscle tension. Isometric exercises are exercises that are done without moving any joints, can be done anywhere, and do not use much equipment or much time. So isometric exercises are efficient exercises and can be done by anyone, with a range of exercise movements that are relatively easy and do not require too much muscle contraction. Intense, this exercise causes minimal injury [34]. This exercise has been proven to reduce blood pressure, is also helpful in preventing muscle atrophy, building muscle volume, increasing joint stability, and reducing edema, and can increase bone density and reduce the risk of bone fractures[18].

One of the benefits of consuming watermelon is that it can lower blood pressure. This plant is rich in flavonoids, which include anticancer, antimicrobial, antiviral, anti-inflammatory, antithrombin, alkaloids, saponins, glycosides, tannins, and phenols. The nutritional content of watermelon is very beneficial for body health [11]. According to research conducted by Nurjannah[13], watermelon juice was given for seven days at a dose of 2 times 350 grams/glass/day.

According to the researchers' analysis, the combination of isometric handgrip exercise therapy with the provision of watermelon juice routinely for one consecutive week causes a decrease in systolic and diastolic blood pressure in hypertension sufferers. Respondents said that after the intervention of a combination of isometric handgrip exercise and watermelon juice, complaints of dizziness decreased, and the body felt more relaxed.

### Bivariate Results

Systolic-diastolic blood pressure before and after intervention in isometric handgrip exercise therapy and watermelon juice to reduce blood pressure using the paired T test.

**Table 5.** Analysis Of The Effect Of Isometric Handgrip Exercise And Watermelon Juice On Reducing Blood Pressure In Hypertension Sufferers

Variable	N	Mean	Mean Difference	elementary school	P Value
Pre-Test Systolic Blood Pressure	18	152.72	12,222	3,405	0,000
Post-Test Systolic Blood Pressure		140.50			
Pre-Test Diastolic blood pressure	18	89.72	9,389	4,286	0,000
Post-Test Diastolic blood pressure		80.33			

Table 5 shows a significant decrease in the mean pre-test and post-test systolic blood pressure with a difference of 12.22 mmHg, while the mean pre-test and post-test diastolic blood pressure with a difference of 9,389 mmHg. Giving isometric handgrip exercise therapy and giving watermelon juice affected reducing systolic blood pressure with a p-value of 0.000 ( $p < 0.05$ ) and diastolic blood pressure with a p-value of 0.000 ( $p < 0.05$ ).

The results of this study show that there is an effect of isometric handgrip exercise and watermelon juice on reducing blood pressure in hypertension sufferers in the RT 07 RW 06 Pengasinan Sawangan Depok area with a p-value for systolic blood pressure of 0.000 ( $p < 0.05$ ) and diastolic blood pressure p value 0.000 ( $p < 0.05$ ). The results of this research are in line with research conducted by Prastiani et al. (2023) entitled The application of isometric handgrip exercise to reduce blood pressure in sufferers of grade 1 hypertension, shows a p-value of 0.000, which means or p-value of  $0.000 < 0.05$  with the conclusion that the application of isometric handgrip exercise can reduce systolic and diastolic blood pressure in sufferers of grade 1 hypertension. 1.

Isometric handgrip exercise causes muscle compression in the blood vessels, which produces an ischemic stimulus. Ischemic stimuli induce an increase in brachial artery flow to reduce the direct effect of ischemia on these vessels. When the pressure is released, the blood vessels in the forearm expand. The occurrence of dilatation in the distal blood vessels, namely the brachial artery, will induce a shear stress stimulus. The shear stress mechanism causes the release of endothelium derivatives of nitric oxide (NO), which are produced by endothelial cells as a vasodilator of blood vessels. NO is a crucial indicator of endothelial cells, where endothelial cells are part of the lumen of blood vessels throughout the body and have an essential role in connecting blood circulation and smooth muscle cells in blood vessels. A certain amount of NO will also diffuse into the walls of arteries and veins (smooth muscle) and activate enzymes, which will stimulate and trigger relaxation in the muscles, which allows blood vessels to enlarge (increasing the diameter of blood vessels), which results in blood flowing smoothly and a decrease in blood pressure. This is because isometric handgrip exercise therapy can reduce the hormones epinephrine and norepinephrine, where the decrease in these hormones will have an effect on the work of the heart, when the heart pumps blood it will decrease so that blood pressure will also decrease[35].

This research is in line with that carried out by Yanti & Rizkia[36] was obtained from the paired t-test blood pressure test before and after administering isometric handgrip therapy where the mean value was 4.034 with std. Deviation of 1.267 with a confidence level of 95% with an  $\alpha$  value of 0.05 from a significant value of 2 tiles of 0.000 or  $0.000 < 0.05$ ; thus, it can be concluded that there is an effect of providing isometric handgrip therapy on reducing blood pressure in hypertension sufferers in the working area of the Batang Kuis Health Center. This is supported by research conducted by Nurleny[37] regarding the Effect of Watermelon Juice on Reducing Blood Pressure in Hypertension Sufferers in the Nanggalo Community Health Center Working Area, showing the results that there was a decrease in blood pressure after the watermelon juice intervention compared to before with a p-value of 0.000 ( $< 0.005$ ).

Watermelon is a fruit that has many health benefits. Watermelon contains many substances that function to maintain body health. The amino acid citrulline in watermelon is used by the body to produce the amino acid arginine, and the amino acid arginine is used by blood vessel lining cells to make nitric oxide. This substance plays a role in reducing tension in blood vessels so that it can lower blood pressure and prevent heart disease. Apart from

that, sutruline and arginine also play a role in the formation of urea in the liver from ammonia and CO<sub>2</sub> so that urine output increases[37]

The potassium content in watermelon can reduce systolic and diastolic blood pressure by inhibiting the release of renin, resulting in increased sodium and water excretion. Renin circulates in the blood and works and catalyzes the breakdown of angiotensin into angiotensin I. Angiotensin I changes into angiotensin II with the help of Angiotensin Converting Enzyme (ACE). Angiotensin II has excellent potential to increase blood pressure because it acts as a vasoconstrictor and can stimulate aldosterone. Aldosterone increases blood pressure by inhibiting sodium excretion. With the presence of potassium in the blood, the action of aldosterone is inhibited by potassium, so that sodium can be excreted through urine, and then blood pressure decreases[14]

Watermelon also contains potassium, which contributes to its diuretic effect. Potassium is an intracellular ion that binds sodium through an exchange mechanism. Increasing potassium intake is associated with lowering blood pressure because potassium can cause natriuresis (loss of sodium in the urine). When a lot of sodium is lost through urine, blood pressure will also slowly fall[38]. Permana and Miftahun also carried out the same research in 2021, where the application of 200 ml of watermelon juice for three consecutive days could reduce blood pressure, which initially had an average diastolic pressure of 100 mmHg, decreasing to 80 mmHg. The combination of isometric handgrip training with the administration of watermelon juice was proven to reduce blood pressure in this study, as evidenced by the difference in the average decrease in systolic blood pressure of 12,222 mmHg. In comparison, the difference in diastolic blood pressure was 9.38 mmHg.

According to researchers' analysis, isometric handgrip training is efficient in helping to lower blood pressure, because this exercise is very easy to do and can be done anywhere. Apart from doing isometric handgrip exercises, watermelon juice is also very effective for lowering blood pressure. In contrast, watermelon is a fruit that is readily available at an affordable price but has a multitude of benefits for patients suffering from hypertension.

## CONCLUSION

The conclusions from the results of this research are: The characteristics of respondents based all respondents were in early old age, 14 respondents (77.8%), most of whom were female, and 10 respondents (55.6%). The average pre-test systolic blood pressure is 152.72 mmHg with a standard deviation of 9,510 mmHg. The average post-test systolic blood pressure is 140.50 mmHg with a standard deviation of 8,638 and a difference of 12,222 mmHg. The average pre-test diastolic blood pressure is 89.72 mmHg, with a standard deviation 7.379. The average post-test diastolic blood pressure is 80.33 mmHg with a standard deviation of 4.433 and a difference of 9,389 mmHg. The isometric handgrip and watermelon juice were proven to have an effect in lowering blood pressure in hypertension sufferers in the RT 07 RW 06 Pengasinan Sawangan Depok area with a p-value of systolic blood pressure of 0.000 ( $p < 0.05$ ) and diastolic blood pressure of 0.000 ( $p < 0.05$ ). The researcher experienced problems when initially conducting the research and convincing

respondents to take part in it because some respondents were initially afraid to participate, but after being explained by the researcher, the respondents were willing to take part.

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