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THE EFFECT OF ISOMETRIC HANDGRIP EXERCISE ON THE REDUCTION OF HIGH BLOOD PRESSURE IN HYPERTENSIVE PATIENTS AT THE KEBOMAS HEALTH CENTER

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ABSTRACT

Introduction: Hypertension is a condition in which systolic blood pressure is more than 140 mmHg and diastolic blood pressure is more than 90 mmHg. Hypertension is called a silent killer, so in any situation when blood pressure increases drastically it can cause death. The number of hypertension patients in Gresik Regency hospitals is 10,375 people. The intervention designed to reduce hypertension is Isometric Hangdrip Exercise, which functions to reduce cardiovascular reactivity to psychological factors, so that it can reduce systolic blood pressure by about 7 mmHg and diastolic by about 5 mmHg. This study aimed to evaluate the effect of Isometric Handgrip Exercise on reducing systolic and diastolic blood pressure in hypertensive patients at the Kebomas Health Center.

Method: The design of this study is Pre-Experimental Design. This type of research is a quantitative research with the One Group Pretest – Posttest approach. The population in this study is 227 people with hypertension in the Kebomas Health Center area aged 46 – 65 years. Sampling was carried out using the Purposive Sampling method with a sample of 38 people.

Results: The results of the Wilcoxon statistical test showed that the Systolic blood pressure significantly decreased after intervention ($p < 0.001$) and Diastolic blood pressure significantly decreased after intervention ($p < 0.05$). This shows significant results. Isometric Handgrip Exercise performed for 5 consecutive days can reduce systolic blood pressure by 13 mmHg and diastolic blood pressure by 8 mmHg.

Conclusion: There is an effect of Isometric Handgrip Exercise on the reduction of blood pressure in hypertensive patients at the Kebomas Health Center.

Keywords: Blood Pressure, Hypertension, Isometric Handgrip Exercise.

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INTRODUCTION

High blood pressure or hypertension is a condition in which systolic blood pressure is greater than or equal to 140 mmHg and diastolic blood pressure is greater than or equal to 90 mmHg. Hypertension is a circulatory system disorder in which blood pressure rises above normal limits (Oktavia et al., 2023). According to (Kemenkes, 2016), an increase in blood pressure in the arteries is known as hypertension. Hypertension often creates a change in blood vessels that can cause higher blood pressure in a person (Wulandari et al., 2023). According to (Saputri et al., 2024), 90% of hypertensive patients do not know the cause of their hypertension. Hypertension is divided into 2, namely primary hypertension and secondary hypertension. Primary or essential hypertension is hypertension that is idiopathic in nature and the cause is unknown (Abdullah et al., 2024). The majority of patients have essential or primary hypertension, of Unknown or

idiopathic cause (Silvia et al., 2024). Secondary hypertension is hypertension caused by health problems or the presence of other diseases (Cahyanti et al., 2024). One of the diseases associated with secondary hypertension is kidney disease (Kadir, 2018). "Hypertension is known as a silent killer because its symptoms are often unpredictable. A sudden spike in blood pressure can lead to fatal outcomes. Based on research conducted (Yusuf & Boy, 2023) the symptoms of hypertension that often appear are only mild symptoms such as headaches, dizziness, visual disturbances, palpitations and others. Worldwide, hypertension is the leading cause of premature death. In Southeast Asia, it occupies the 3rd place with the highest incidence of hypertension is 25% (Jabani et al., 2021). In East Java Province, there are around 11,600,444 people with hypertension who are over 15 years old, with a proportion of 48.8% men and 51.2% women (Dinas Kesehatan Provinsi Jawa Timur, 2022). Meanwhile, the number of hypertension patients hospitalized in Gresik Regency according to (BPS Gresik, 2023) is 10,375 people. With such a large number, hypertension should be a concern for many parties to prevent an increase in the death rate due to hypertension. Hypertension not only affects individuals, but also becomes a major burden on public health systems and the economy. Globally, hypertension is a leading cause of premature death, and increases the risk of cardiovascular diseases such as stroke, heart failure, and chronic kidney disease. This condition leads to increased visits to health facilities, the need for hospitalization, lifelong medication use, and the risk of serious complications requiring expensive medical interventions. On the economic side, hypertension contributes to direct costs in the form of expenditures on health services and medicines, as well as indirect costs such as loss of work productivity due to illness and premature death. According to WHO, cardiovascular diseases due to hypertension are responsible for more than 10% of health expenditures in developing countries. Therefore, prevention and management of hypertension are essential to reduce this burden both from a public health and national economic perspective. In the treatment of hypertension, there are several ways of treatment, namely pharmacological and non-pharmacological treatment. Medication side effects caused by prolonged use of antihypertensive medications can cause damage to certain organs. As a result, in order for patients to maintain their quality of life and reduce dependence on drugs, patients can use non-pharmacological therapies (Prastiani et al., 2023). According to the American Heart Association (AHA), isometric handgrip Exercise can help lower blood pressure in hypertensive patients (Zainuddin & Labdullah, 2020). The application of innovative intervention of handgrip gripping exercise becomes important for reducing the percentage of hypertension (Choirillaily & Ratnawati, 2020). This exercise allows blood flow to be smoother, which can trigger ischemic stimulation through the shear stress mechanism resulting from muscle contraction (Lucya et al., 2024). Isometric handgrip Exercise can reduce cardiovascular reactivity to psychological factors (Widiyawati et al., 2022). Isometric Handgrip exercise is a static movement in which the muscles contract without changing the length or movement of the joints. One intervention designed to lower blood pressure is isometric handgrip Exercise, which is used to measure the ability of the hand to grip. Isometric Handgrip Exercise is a static exercise with a hand dynamometer that can lower systolic hypertension blood pressure by about 7 mmHg and diastolic by about 5 mmHg (Octavia et al., 2023). The hypothesis in this study is that isometric handgrip exercise intervention can significantly reduce blood pressure.

METHOD

In this study the research design used by researchers is Pre-experimental Design. This type of research is a quantitative research with one group Pretest–Posttest approach. The dependent variable or dependent variable is the variable that is affected by the independent variable and the independent variable is the variable that causes the dependent variable to change (Ningsih let al., 2021). The dependent variable in this study is hypertension, the independent variable in this study is isometric handgrip exercise. Population is the overall object or objects of research to bel studied (Fazila Amin let al., 2023). The population in this study is hypertensive patients in Kebomas Health Center which amounted to 76 people. Sample is a part or representatively that represents the characteristics of the population (Fazila Amin let al., 2023). Sample selection in this study used inclusion criteria, namely patients who had a history of hypertension and were taking antihypertensive medication. In this study for sampling using Purposive Sampling method, Purposive sampling is the selection of samples where samples are taken with certain criteria and goals (Aziz et al., 2024). In determining the number of samples using the formula notoatmodjo obtained a sample of 38 people. Researchers in this study used instruments such as blood pressure observation

sheet and digital tensimeter to measure the patient's blood pressure. Filling in the blood pressure observation sheet was done before and after the isometric handgrip exercise was given. Handgrip tool used in this study using Adjustable Handgrip type tool. Each patient was given an intervention for 5 consecutive days with a duration of 3 minutes and then the patient was asked to rest for approximately 5 minutes and then his blood pressure was measured again. The author recorded each result of the isometric handgrip exercise intervention before and after it was carried out to monitor whether there was a decrease in blood pressure or not. This study was conducted from October 10, 2024 to October 29, 2024. Data analysis used in this study is SPSS version 23 using Wilcoxon Signed Rank Test, the success rate of this test is 95%, This test is used to determine the difference between two variable conditions. In this study, the data compared were blood pressure data before being given isometric handgrip exercise intervention and after being given isometric handgrip exercise intervention. This study pays attention to research ethics and does not violated research ethics, so that no party is harmed and maintains the security of respondent data. This is evidenced by the ethics sheet No. 081/KELT/II.3.UMG/KELP/A/ 2024. Based on the interventions that the author wrote in this article, the ethics committee has considered and approved this research to be conducted on respondents in accordance with the ethical procedures themselves.

RESULTS

Table 1. Characteristics of respondents in the form of age, gender, occupation, long suffering, and treatment of hypertensive patients at Kebomas Health Center.

Characteristic	Frequency (f)	Percentage (%)
Age		
46-65 years	38	100
Total	**38**	**100**
Gender		
Men	35	92.1
Women	3	7.9
Total	**38**	**100**
Occupation		
Bekerja	22	57.9
Tidak Bekerja	16	42.1
Total	**38**	**100**
Long Suffering		
1 years	26	68.4
2 years	9	23.7
3 years	3	7.9
Total	**38**	**100**
Treatment of Hypertensive	37	97.4
Routine	1	2.6
Sometimes		
Total	**38**	**100**

Based on Table 1 above can be known entirely (100%) lancia hypertelnsive patients in Kebomas Health Centelr aged 46-65 years. By gender almost all (92.1%) elderly people with hypertension with the most gender is female. Based on employment data, most (57.9%) of the elderly work. Based on long-suffering data, most (68.4%) long suffered from hypertension for 1 year. Based on the data of hypertension treatment almost all (97.4%) elderly routinely treated.

Table 2. Average blood pressure before and after isometric handgrip exercise in hypertensive patients at Kebomas Health Center.

	Before (mmHg)	After (mmHg)
Blood pressure		
Systolic	146.34	133.45
Diastolic	87.74	79.95

Based on Table 2, the average systolic blood pressure in hypersensitive patients before isometric handgrip exercise was 146.34 mmHg and diastolic blood pressure was 87.74 mmHg. Systolic blood pressure in hypersensitive patients after isometric handgrip exercise 133.45 and diastolic blood pressure 79.95 mmHg.

Table 3. Data analysis using wilcoxon signed rank blood pressure test before and after isometric handgrip exercise in hypersensitive patients at Kebomas Health Center

	Before (mmHg)	After (mmHg)	p-value
Blood pressure			
Systolic	146.34	133.45	0.000
Diastolic	87.74	79.95	0,008

Based on Table 3 Wilcoxon Signed Rank Test results obtained p values for systolic blood pressure before and after Isometric Handgrip exercise 0.000 (<0.05) and P values for diastolic blood pressure before and after Isometric Handgrip Exercise 0.008 (<0.05) which shows there is an effect of Isometric Handgrip Exercise on blood pressure reduction in hypersensitive patients at Kebomas Health Center.

DISCUSSION

Hypertension is high blood pressure is an abnormal increase in blood pressure in arterial blood vessells with systolic blood pressure higher than 140 mmHg and diastolic blood pressure higher than 90 mmHg. Hypertension is a circulatory system disorder in which blood pressure rises above normal limits (Oktavia et al., 2023). Most people with hypertension

today do not know the exact cause of their increased blood pressure, because the cause of hypertension cannot be clearly ascertained. Risk factors for hypertension include age, sel, unhealthy lifestyle, smoking, salt consumption, obesity, and lack of physical activity (Silfiani et al., 2024). Age, exercise, stress, race, obesity, gender, medication and many other factors can raise blood pressure (Widiharti et al., 2020). Changes in physical activity are very influential on the health status of hypersensitive patients, one of the physical activities that include non-pharmacological treatment is Isometric Handgrip Exercise. The American Heart Association (AHA) says that isometric handgrip exercise performed as an adjunct therapy can reduce blood pressure. The AHA also agrees that these exercises can be used clinically (Pradita Sari & Muhlisin, 2024). Isometric Handgrip Exercise is a movement to contract the hand muscles statically without moving too many joints and muscles. This exercise activates the ischemic stimulus and shear stress mechanism due to muscle contraction in blood vessells. This shear stress activates nitric oxide in endothellial cells, which then diffuses into smooth muscle. Guanylate cyclase, which relaxes smooth muscle, is then released. Thus, this exercise will improve blood circulation and reduce high blood pressure (Ayu Putriantari et al., 2024). Isometric handgrip exercise lowers blood pressure through several physiological mechanisms. First, muscle contraction during exercise increases blood flow and shear stress on the blood vessel wall, triggering the release of nitric oxide (NO) which causes vasodilation and decreased vascular resistance. Second, this shear stress also stimulates relaxation of vascular smooth muscle through the activation of the guanylate cyclase enzyme, improving blood flow. In addition, this exercise increases the sensitivity of pressure baroreceptors which help maintain blood pressure stability, thereby suppressing sympathetic nerve activity and increasing parasympathetic. The effect is a decrease in blood pressure and heart rate. This exercise also improves regulation of the autonomic nervous system by increasing heart rate variability (HRV). Overall, these mechanisms support each other in lowering blood pressure, making isometric handgrip exercise a simple but effective non-pharmacological therapy for hypertension. This is in line with research (Choirillaily & Ratnawati, 2020) and (Widiyawati et al., 2022).

There was a difference in average blood pressure before and after Isometric Handgrip Exercise with average systolic blood pressure before 146.34 mmHg and systolic blood pressure after 133.45 mmHg. While the average diastolic blood pressure before Isometric Handgrip Exercise 87.74 mmHg and diastolic blood pressure after isometric Handgrip Exercise 79.95 mmHg. Based on Table 5.8, it can be seen that the Wilcoxon Signed Rank Test results for systolic blood pressure before and after Isometric Handgrip Exercise obtained a value of p = 0.000 (<0.05), which means that there is an effect of Isometric Handgrip Exercise on blood pressure reduction in hypersensitive patients at Kebomas Health Center. It is also known that the results of the Wilcoxon Signed Rank Test for diastolic blood pressure before and after Isometric Handgrip Exercise obtained a valuel of p = 0.008 (<0.05), which means that there is an effect of Isometric Handgrip Exercise on the decrease in blood pressure of hypersensitive patients at Kebomas Health Center.

This study is in line with research (Oktavia et al., 2023) which states based on statistical tests, obtaineld p-valuel 0.000 or p-value< 0.05 which means there is an effect of isometric exercise handgrip exercise on blood pressure in hypersensitive patients in the Working Area of the State Health Center Queen. In research (Yunia Widiati & Wulandari, 2024) also found wilcoxon test results obtained p-valuel 0.000<0.05 which shows a significant effect of isometric handgrip exercise on blood pressure in the elderly with hypertension in the village of Gringging, Sragen Regency. Some research states that there is a relationship and also a decrease in blood pressure as an effect of Isometric Handgrip therapy. According to the researchers the difference in average blood pressure reduction Isometric Handgrip Exercise in this study with previous studies due to patients taking antihypersensitive drugs on a relgular basis and the response of each person's body is different when taking medication and given isometric handgrip Exercise, in addition to the intervention given researchers performed routinely for 5 consecutive days so that the blood pressure of hypersensitive patients remain stable.

CONCLUSION

1. Blood pressure before isometric handgrip Exercise in hypersensitive patients at Kebomas Puskesmas was average systolic 146.34 mmHg and average diastolic 87.74 mmHg. Blood pressure after isometric handgrip Exercise in hypersensitive patients at Kebomas Puskesmas average systolic 133.45 mmHg and average diastolic 79.95 mmHg.

2. There is an effect of isometric handgrip Exercise on the reduction of high blood pressure in hypersensitive patients at Kebomas Health Center with p value of systolic blood pressure 0.000 and

diastolic blood pressure 0.008. Based on these results, the application of innovative interventions for handgrip training is important for reducing the percentage of hypertension cases. In addition, isometric handgrip exercise can also be used as a non-pharmacological therapy at the Kebomas Health Center as an alternative to reducing blood pressure.

3. Suggestions for future researchers are to use a larger sample size and use randomized controlled trials to establish causality. .

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