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Changes in Blood Pressure of Hypertension Patients With Therapy Non Pharmacological Use of Celery Leaves

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Abstract *Background High blood pressure or hypertension is one of the biggest causes of death in the world. Adopting a healthy lifestyle can prevent or slow the onset of hypertension and reduce cardiovascular risk Apiin and mannitol content in celery leaves have diuretic properties that help draw fluid and support kidney function in removing excess fluid from the body. This process can significantly lower blood pressure in people with hypertension Objectives to determine changes in blood pressure in hypertensive patients with non-pharmacological therapy using celery leaves Quasi-Experimental design method with Pre-test and Post-test control group design. Samples were taken using Purposive Sampling technique as many as 30 people Research Results From the characteristics of respondents and based on statistical tests with the Wilcoxon Test in the intervention group Pre-test Post-test obtained Asymp. Sig. value of 0.890 Conclusion There is no significant change between the intervention group and the control group in the provision of non-pharmacological therapy using Celery leaves Suggestions For people with hypertension to always seek information in improving self-management in order to reduce the risk of cardiovascular diseases such as hypertension.*

Keywords: *Blood Pressure Changes, Celery Leaves,Therapy*

I. INTRODUCTION

High blood pressure or hypertension is one of the leading causes of death in the world and can cause various serious complications, such as coronary heart disease, myocardial infarction, stroke, and kidney failure. Individuals with hypertension have a 3-5 times higher risk of having a heart attack compared to those without hypertension. This risk increases with age, due to natural physiological changes in the heart, blood vessels, and hormonal system. High blood pressure, especially systolic blood pressure (SBP), is a major modifiable risk factor for preventing cardiovascular disease and aging-related disorders. In women, the increase in SBP becomes more significant with age, with the prevalence of SBP above 120 mmHg in postmenopausal women exceeding the same figure in men of the same age. This increase is often associated with vascular endothelial dysfunction, triggered by oxidative stress due to excess reactive oxygen species, resulting in decreased nitric oxide bioavailability.(Craighead et al. 2022). Hypertension is a rapidly growing health problem according to data from the Centers for Disease Control and Prevention (CDC), more than 40% of adults aged 45 to 64 years and more than 70% of adults aged 65 years and older are diagnosed with hypertension (CDC, 2016). The physical damage from hypertension is cumulative, so it is important to maintain adherence to treatment as part of a prevention strategy for more severe diseases, such as end-stage renal disease, heart failure, and stroke, higher severity of hypertension is associated with an 80% increase in stroke mortality and a 50% increase in heart disease mortality(Kang, Dulin, and Risica 2020). Hypertension is most common in developing countries reaching 40% and in developed countries only 35%. According to the American

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Heart Association (AHA, 2016) in America 59% of hypertension sufferers and only 34% are under control, sufferers aged over 20 years reach 74.5 million people while hypertension sufferers in Indonesia reach 34.1% (around 15 million) and only 4% are under control, South Sulawesi in 2019 as many as 25.06% experienced hypertension and one of the areas with a fairly high prevalence of hypertension sufferers is North Toraja in 2023 in January as many as 1.59% with the number of women as many as 2.28% and men as many as 0.96%, This percentage is clearly seen in the hypertension examination service in Lembang La'bo, Sanggalangi District in 2024 from January - March as many as 40 people with the number of women as many as 35 people and men as many as 5 people (Torut Health Office, 2024). This condition can occur anywhere due to several risk factors for hypertension, such as a history of diseases such as kidney failure, diabetes mellitus, stroke and other diseases, so special education is needed in handling hypertension so that complications do not occur.(Sriwahyuni, Sri Darmawan 2022), Adopting a healthy lifestyle can prevent or slow the onset of hypertension and reduce cardiovascular risk. A healthy lifestyle can also delay or prevent the need for drug therapy in grade 1 hypertension, but should not delay initiation of drug therapy in patients with organ damage due to hypertension or high cardiovascular risk. Healthy lifestyles that have been proven effective in lowering blood pressure include limiting salt and alcohol intake, increasing vegetable and fruit intake, losing weight and maintaining ideal body weight, regular physical activity, and avoiding smoking.(Dika Lukitaningtyas 2023).

Hypertension management is divided into two categories, namely the first pharmacological involving the use of drugs according to a doctor's prescription, such as diuretics, beta blockers, calcium antagonists, ACE-inhibitors, angiotensin converting enzyme (ACE), and vasodilators.(Princess Dafriani 2019)but it is very important to remember the significant impact and risk factors caused by this condition because blood pressure in people with hypertension tends to fluctuate, so it requires long-term treatment, even for life so that it can cause negative side effects such as impaired kidney or liver function, The second is non-pharmacological therapy which is often preferred because it is considered safer and can provide positive benefits in the long term, so that various approaches are needed, including lifestyle changes such as a balanced diet, increased physical activity, stress management, and the use of medicinal plants that have been proven to have the effect of lowering blood pressure. Medicinal plants such as garlic, celery leaves, and green tea have been studied and shown positive results in lowering blood pressure without dangerous side effects.(Febri S Yolanda, Nury Lutfiatil Fitri 2024).

Celery (Apium Graveolens L.) is a winter vegetable belonging to the Umbelliferae family and is widely cultivated and consumed on a global scale. This plant is grown under irrigated conditions for both its leaves and roots, which are the edible parts that have high nutritional value and are rich in calcium, phosphorus, iron, carotene, vitamins and other nutrients.(RICH 2023)Food crops caused by projections of changes in the earth's climate(Wing, De Cian, and Mistry 2021)In addition to having high nutritional value, celery leaves (Apium graveolens) also contain various beneficial compounds, including saponins, tannins of 1%, flavonoids, essential oils of 0.033%, flavoglucosides, aphyghenin, phytosterols, choline, lipase, pthalides, asparagine, and vitamin complexes. Aphyghenin functions to help relieve narrowed blood vessels, while pthalides have the ability to relax arterial muscles, so they can help reduce blood pressure. The apiin and mannitol content in celery leaves has diuretic properties that help draw fluids and support kidney function in removing excess fluid from the body. This process can significantly lower blood pressure in people with hypertension. In addition, flavonoids in celery leaves have antioxidant properties that can protect blood vessels from oxidative damage, which is often the cause of increased blood pressure. By consuming celery leaves, people with hypertension can benefit from various compounds that work synergistically to control and lower blood pressure(2023).The use of traditional medicine is increasing because it is cheaper, does not contain chemicals, and has significant healing effects. Complementary therapy is often chosen because traditional medicine tends to have fewer side effects compared to modern medicine (Ananda, 2022). Several studies have shown that boiled celery leaves can lower blood pressure, one of the effective traditional medicines for lowering blood pressure in people with hypertension is celery leaves(Oktafiana, Qodir, and Wulandari 2023). This plant is used in medicine as an anti-inflammatory and antibacterial agent as well as in the food and cosmetic industries.(Moustakas et al. 2024).Based on the background above, as a researcher, I am interested in knowing about "Changes in Blood Pressure in Hypertension Patients with Non-Pharmacological Therapy Using Celery Leaves"

2. RESEARCH METHODS

This study used a Quasi-Experimental design with a Pre-test and Post-test control group design. With a population of 40 hypertensive patients since January - March consisting of 35 women and 5 men. Samples were taken using the Purposive Sampling technique based on the Inclusion Criteria, namely Hypertensive patients aged > 40 years, diagnosed with hypertension > 6 months, have a history of hypertension stage 1 and 2, willing to be respondents

and on the Exclusion Criteria, namely Patients who are currently in intensive care. In a study with a small population (less than 100), determining a sample of around 50-80% of the population, therefore, an adequate sample of 30 people will be divided into 2 groups, namely 15 people for the Intervention group and 15 people for the control group. The intervention group will have their blood pressure checked before being given celery leaves which can be consumed twice a day around 50-100 ml for one week, while the control group does not receive intervention, namely the provision of celery leaves but still has their blood pressure checked. One week after the administration of celery leaves, a post-test or re-measurement of blood pressure was conducted using a digital sphygmomanometer to determine changes in the respondents' blood pressure. Data analysis was performed using SPSS with univariate and bivariate analysis methods, and the Wilcoxon test with a p value <0.05.

3. RESULTS AND DISCUSSION

Research result

Table 1. Respondent Characteristics (n:30)

Variables	Category	Frequency (n)	Percentage (%)
Gender	Man	5	16.7
	Woman	25	83.3
Age	40-45 Years	11	36.7
	46-50 Years	8	26.7
	51-55 Years	7	23.3
	≥ 56 Years	4	13.3
Education	Elementary School/Equivalent	4	13.3
	Junior High School/Equivalent	8	26.7
	High School/Equivalent	18	60.0
Work	civil servant	4	13.3
	Housewife	18	60.0
	Self-employed	8	26.7

Source: Primary Data, 2024

Based on table 1, the frequency distribution of respondent characteristics based on gender shows the results of the study, there are 5 male respondents (16.7%) and 25 female respondents (83.3%). In the frequency distribution of age, the most are in the age range of 40-45 years, namely 11 respondents (36.7%) and the least are in the age range of ≥ 56 years,

namely 4 respondents (13.3%). In the frequency distribution of respondent education, the least are elementary school/equivalent with a total of 4 respondents (13.3%) and the most are high school/equivalent with a total of 18 respondents (60.0%), while in the frequency distribution of work, the least are working as civil servants, namely 4 respondents (13.3%) and the most are working as housewives, namely 18 respondents (60.0%).

Table 2. Frequency Distribution Description Based on Pre-post Test of Hypertension Degree in Intervention Group in Hypertension Patients in Blood Pressure Changes (n:15)

Hypertension Degree in Intervention Group	*Pre-test*		*Post-test*	
	N	%	n	%
130-139/80-89 MmHg	6	40.0	8	53.3
≥ 140/90 MmHg	8	53.3	5	33.3
≥ 180/120 MmHg	1	6.7	2	13.3

Source: Primary Data, 2024

In table 2, frequency distribution based on pre-post test of hypertension degree in intervention group, it is obtained that the most dominant pre-test research results obtained hypertension degree range ≥140/90 MmHg with 8 respondents (53.3%) and the least obtained hypertension degree range ≥180/120 MmHg, namely 1 respondent (6.7%). While in the post-test, the most dominant obtained hypertension degree range between 130-139/80-90 MmHg, namely 8 respondents (53.3%) and the least obtained hypertension degree range ≥180/120 MmHg, namely 2 respondents (13.3%).

Table 3. Frequency Distribution Description Based on Pre-post Test Hypertension Degree in Control Group in Hypertension Patients in Blood Pressure Changes (n:15)

Degree of Hypertension in Control Group	*Pre-test*		*Post-test*	
	N	%	n	%
130-139/80-89 MmHg	9	60.0	7	46.7
≥ 140/90 MmHg	5	33.3	7	46.7
≥ 180/120 MmHg	1	6.7	1	6.7

Source: Primary Data, 2024

In table 3, frequency distribution based on pre-post test of hypertension degree of control group, it is obtained a picture of the results of the pre-test research, the most dominant obtained a range of hypertension degree between 130-139/80-89 MmHg with a total of 9 respondents (60.0%) and the least obtained a range of hypertension degree ≥180/120 MmHg, namely 1 respondent (6.7%). While in the post-test there were the same results in the range of hypertension degree between 130-139/80-90 MmHg and ≥140/90 MmHg, namely with a

presentation of 45.7%, and there was 1 respondent who obtained a range of hypertension degree ≥180/120 MmHg, To find out changes in blood pressure in hypertensive patients with non-pharmacological therapy, a data normality test is first carried out, where if the results obtained show normally distributed data, the alternative test used is*paired test*or t-test, but ifThe results obtained show that the data is not normally distributed, so the alternative test used is the t test.*Wilcoxon.* The results of the data normality test are as follow

Table 4. Results of the Pre-post Test Normality Test for the Degree of Hypertension in the Intervention Group with Non-Pharmacological Therapy in Changes in Blood Pressure (n:15)

Shapiro Wilka				
Pre-test		Statistics	df	Sig.
Post-test	130-139/80-89 MmHg	.640	6	.018
	≥ 140/90 MmHg	.782	8	
	≥ 180/120 MmHg	.260	1	

Source: Primary Data, 2024

Based on table 4, the results of the normality test, namely Shapiro-Wilk in the intervention group, the statistical value obtained in the range of hypertension degrees between 130-139 / 80-90 MmHg = 0.640, in the range of hypertension degrees ≥140 / 90 MmHg = 0.782 and in the range of hypertension degrees ≥180 / 120 MmHg = 0.260 with a total of 15 respondents. Based on the results of the ASymp Sig output analysis = 0.018 <value*alpha*= 0.05, which means that the data obtained is not normally distributed. so thatThe alternative test used is the Wilcoxon test.

Table 5. Results of the Pre-post Test Normality Test of the Degree of Hypertension in the Control Group with Non-Pharmacological Therapy in Changes in Blood Pressure (n:15)

Shapiro Wilka				
Pre-test		Statistics	df	Sig.
Post-test	130-139/80-89 MmHg	.655	9	.000
	≥ 140/90 MmHg	.883	5	
	≥ 180/120 MmHg	.260	1	

Source: Primary Data, 2024

Based on table 5, the results of the normality test, namely Shapiro-Wilk in the control group, the statistical value obtained in the range of hypertension degrees between 130-139 / 80-90 MmHg = 0.655, in the range of hypertension degrees ≥140 / 90 MmHg = 0.882 and in the range of hypertension degrees ≥180 / 120 MmHg = 0.260 with a total of 15 respondents. Based on the results of the ASymp Sig output analysis = 0.000 <value*alpha*= 0.05, which means that the data obtained is not normally distributed. so thatThe alternative test used is the Wilcoxon Test

Table 6 Changes in Hypertension Degree in the Intervention Group

	N	Min	Max	Mean	Std. Deviation	Z	Sig.
*Pre-test*Degree of Hypertension	15	1	3	1.67	.617	-.333	.739
*Post-test*Degree of Hypertension		1	3	1.60	.737		

Source: Primary Data, 2024

Analysis In table 6, the average results of the pre-test hypertension degree value were 1.67 with a standard deviation of 0.617, while the average results of the post-test hypertension degree value were 1.60 with a standard deviation of 0.737. Statistical test results*Wilcoxon*show value*ASymp Sig* =0.739 >*alpha*= 0.05, then it can be concluded that there was no significant change in blood pressure levels in the intervention group afternon-pharmacological therapy in the form of using celery leaves.

Table 7 Changes in Hypertension Degree in the Control Group

	N	Min	Max	Mean	Std. Deviation	Z	Sig.
*Pre-test*Degree of Hypertension	15	1	3	1.47	.640	-.632	.527
*Post-test*Degree of Hypertension		1	3	1.60	.632		

Source: Primary Data, 2024

Analysis In table 7, the average results of the pre-test hypertension degree value were 1.47 with a standard deviation of 0.640, while the average results of the post-test hypertension degree value were 1.60 with a standard deviation of 0.632. Statistical test results*Wilcoxon*show value*ASymp Sig* =0.632 >*alpha*= 0.05, then it can be concluded that there was no significant change in blood pressure levels in the control group.

Table 8 Mann-Whitney Test Results Comparison of Blood Pressure Changes in the Intervention Group and Control Group with Non-Pharmacological Therapy Using Celery Leaves.

Ranks				
	Blood Pressure Changes	**N**	**Mean Rank**	**Sum of Rank**
Group	Intervention	15	15.30	229.50

Control	15	15.70	235.50
Total	**30**		

Test Statistics	
Mann-Whitney U	109,500
Wilcoxon W	229,500
Z	-.138
Asymp. Sig. (2-tailed)	.890

Source: Primary Data, 2024

Based ontable8 shows that the mean rank/average value in the intervention group is 15.30 which is not too low with the control group which is 15.70, the Mann-whiteny U value is 109,500 and the Wilcoxon W value is 229,500 which when converted to a Z value is -0.138. The Asymp. Sig. value of 0.890 means that there is no significant comparison between the intervention group and the control group in the administration of Non-Pharmacological Therapy Using Celery Leaves.

4. DISCUSSION

From the characteristics of the respondents and based on statistical tests with the Wilcoxon Test in the Pre-test Post-test intervention group, the Asymp. Sig. value was obtained. Of 0.890, it can be interpreted that there is no significant comparison between the intervention group and the control group in the provision of non-pharmacological therapy using Celery leaves. In this study, the characteristics of respondents such as age, gender, education, and occupation have a significant influence on the effectiveness of non-pharmacological therapy using celery leaves. Based on the dominant age of the respondents, it is 40-45 years, namely 11 respondents (36.7%). This occurs because the older the age, the sensitivity to hypertension will increase, this is the effect of degeneration in people who are getting older. The older a person is, the functions of their organs will also change and decline, such as decreased heart function and other organs. The risk of hypertension tends to increase with age, due to decreased organ function, especially in the elderly, which makes them more susceptible to various chronic diseases, including hypertension. In addition, the sensitivity of blood pressure regulators, namely the bareceptor reflex, also decreases. The aging process causes changes in the structure of large blood vessels, so that the lumen becomes narrower and the blood vessel walls become stiffer, resulting in an increase in systolic blood pressure.(Ariyani 2020)which is a major risk factor for cardiovascular and cerebrovascular disease and can cause death.(Bethany and Zajacova Anna 2016). Age can affect an individual's response to therapy, where older individuals may have more complex health conditions and different drug interactions. Based

on the results of the study of respondents by gender, it was found that the majority of respondents in the intervention group were women, as many as 25 respondents (83.3%), This is due to the presence of the hormone estrogen in women, which is associated with the accumulation of fat in the blood, which often occurs in women making them more susceptible to high blood pressure. Menopause is associated with an increased risk of cardiovascular disease and high blood pressure compared to the perimenopause period, blood pressure during the climacteric period, which is influenced by age at menopause and duration of menopause, indicating that estrogen deficiency may contribute to high blood pressure in elderly women by 65%, while 35% can be influenced by lifestyle factors and other factors(Fera Yulistina, Sri Maryati Deliana 2017). Gender also plays a role, because hormonal differences and health patterns between men and women can affect the results of therapy. From the level of education, public awareness is sufficient because the majority have a high school education/equivalent with a total of 18 respondents (60.0%), The level of education of respondents is related to understanding and compliance with therapy, where individuals with higher education tend to be more open to non-pharmacological approaches, but this is not solely due to differences in education levels, but education levels affect a healthy lifestyle by not smoking, not drinking alcohol, and exercising more often (Yuliarti 2017). And from work, many work as housewives, namely 18 respondents (60.0%)Housewives often face challenges in managing time for themselves, which can affect their overall health, including blood pressure.In addition, work can affect health and response to therapy, where different work stress and lifestyle can affect the effectiveness of therapy, the strong relationship between augmentation index and peak cardiac power output during exercise, suggests that measures of vascular function can be used as predictors of cardiac pumping ability in older adults. Further data show a significant decline in vascular function, but not cardiac function with age. Vascular and cardiac function decline significantly and are strongly associated with poor short-term and long-term prognosis.(Houghton et al. 2016)

5. CONCLUSION

Asymp. Sig. Value of 0.890 means that there is no significant comparison between the intervention group and the control group in the provision of Non-Pharmacological Therapy Using Celery Leaves.

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