ANALYSIS OF DIFFERENCES IN THE EFFECTIVENESS OF GIVING RED BEET JUICE (*BETA VULGARIS L*) AND CUCUMBER JUICE (*CUCUMIS SATIVUS*) ON REDUCING BLOOD PRESSURE IN HYPERTENSIVE PATIENTS

Srie Wahyuni[1*], Rahma Wati[2], Mhd. Hidayatullah[3]
[1-3]Department of Public Health, Faculty of Health Sciences,
Universitas Abulyatama, Aceh Besar
E-mail: [1)] sriewahyuni3139@gmail.com, [2)] rahma694wati@gmail.com

Abstract

Hypertension is a serious health issue worldwide, leading to cardiovascular diseases like heart attack, heart failure, stroke, and kidney disease. To prevent hypertension, a combination of pharmacological and non-pharmacological methods is necessary, including adopting a healthy lifestyle and consuming herbal plants. For instance, cucumber juice therapy and a mix of beetroot and pineapple juice are commonly used. This study aims to compare the effects of red beet juice and cucumber juice on the blood pressure of hypertensive patients in Drien Tujoh Village, Tripa Makmur District, Nagan Raya Regency in 2023. The research involved 30 hypertensive patients over 35 years old, divided into two groups. The results showed a significant difference in blood pressure before and after the intervention with beetroot juice and cucumber juice. This indicates that both interventions can help lower blood pressure in hypertensive patients.

Keywords: *Hypertension, Root, Cucumber, Red Beet*

1. INTRODUCTION

Along with the times, whether we realize it or not, humans tend to adopt a modern lifestyle. This kind of lifestyle makes people love instant things. As a result, they tend to be lazy to do physical activities and like to consume instant foods, which have high fat and sodium content. Instant foods are usually high in calories. Fatty foods are associated with increased body weight and elevated blood fat levels, which can exacerbate the condition of hypertensive patients. Excess sodium intake can lead to fluid imbalances in the body, potentially causing edema, ascites, or worsening hypertension (Medika, 2017).

Globally, the World Health Organization estimates the prevalence of hypertension to be 11% of the world's population. A number of these sufferers, only less than a fifth make efforts to control their blood pressure. The incidence of hypertension in Indonesia according to the results of the Basic Health Research (2018) based on measurements in the population aged> 18 years is (34.1%) the highest in South Kalimantan Province (44.1%), while the lowest in Papua is (11.1%). Then there are 91,145,364 people affected by hypertension. While the death rate in Indonesia due to hypertension is 417,118 deaths. Hypertension occurs in the age group 31-44 years (31.6%), age 45-54 years (45.3%), age 55-64 years (55.1%). The incidence of hypertension in Aceh is ranked 10th out of 34 provinces in Indonesia, which is as much as 18% or around 416, 684 people (Riskesdas 2018).

In 2020, the number of people with hypertension in Aceh who received health services according to standards was 385,813 or 31%, and there were 3 districts whose service coverage reached 100%, namely Southwest Aceh District, Aceh Tamiang and Sabang City. Whereas in 2021, the number of people with hypertension in Aceh who received health services according to the standard was 416,684 or 18%, and there were 1 district whose service coverage reached 100%, namely Aceh Barat Daya District and Pidie District, while Nagan Raya District was in third place with 79% health service coverage. (Aceh Health Profile 2021)

In 2021 the incidence of hypertension at the age of ≥ 15 years in Nagan Raya Regency amounted to 31,447 people consisting of male sufferers aged ≥15 years totaling 15,717 people and female sufferers aged ≥15 years totaling 15,710 people and all recorded hypertension sufferers all received health services according to standards. Whereas in 2022 the incidence of hypertension increased from the previous year, which amounted to 31,819 people aged ≥15 years, consisting of male patients aged ≥15 years totaling 16,406 people and female patients aged ≥15 years totaling 16,413 people (Nagan Raya Health Office).

Based on an initial survey at Lueng Keube Jagat Community Health Center, Tripa Makmur District, Nagan Raya Regency on October 16, 2023. Lueng Keube Jagat Community Health Center has 11 villages in its working area and it was found that the number of people with hypertension who were recorded as having high blood pressure checks was 163 people in 2020. Hypertension sufferers continued to increase in subsequent years, such as in 2021 hypertension sufferers amounted to 187 people, and in 2022 hypertension sufferers who were recorded to do routine checks amounted to 209 people. Patients with hypertension in the Lueng Keube Jagat puskesmas working area are mostly female and the average age ranges from 30-79 years.

A person is said to have hypertension or high blood pressure if a blood test shows results above 140/90 mmHg or more in a state of rest, with two examinations, and an interval of five minutes, in this case 140 or the upper value indicates systolic pressure, while 90 or the value below indicates diastolic pressure while according to Wicaksana et al (2019) Hypertension or high blood pressure is a condition where blood pressure exceeds the normal systolic limit of 140 mmHg or more and diastolic 90 mmHg or more at 1 measurement in an interval of 1 minute.

Hypertension usually has no signs and symptoms. Symptoms that often appear are headaches, a burning sensation in the nape of the neck, or a heavy head. However, these symptoms cannot be used as the presence or absence of hypertension in a person. One way to find out is to check blood pressure regularly. A patient usually does not realize that he has hypertension until damage is found in the organs, such as coronary heart disease, stroke, or kidney failure (Sudarmin et al., 2022).

To prevent hypertension, proper management is needed. Pharmacologically by consuming antihypertensive drugs such as diuretics, sympatholytic inhibitors, alpha adrenergic blockers, adrenergic neuron blockers, arteriolar vasodilators, and ACE inhibitors. While non-pharmacologically, namely by fulfilling several healthy lifestyles by consuming herbal plants (Depkes RI 2016), examples of herbal plants consumed as medicine are cucumber juice therapy and combination therapy of beet juice and pineapple.

DASH (Dietary Approaches to Stop Hypertension) recommends hypertensive patients to consume fruits, vegetables, and drink plenty of water. This therapy can be done such as consuming juices that are high in potassium and lots of water such as Red Beet and cucumber. Red beet and cucumber in the form of juice nutrients will be more easily absorbed so that it is effective to control blood pressure (Noormindhawati & Wahyu, 2016)

Red beet contains nutrients, vitamins, and minerals that can help increase the number of red blood cells, lower blood pressure and reduce digestive problems or problems (Lestario, 2018). The content of vitamins and minerals present in red beets such as B vitamins and calcium, phosphorus, nutrients, iron is an added value of using red beets. Antioxidants are substances needed by the body to neutralize free radicals. Antioxidants will inhibit the chain reaction of free radical formation that can cause oxidative stress. Antioxidants are found in many fruits and vegetables such as red beets and cucumbers (Panjaitan, 2020).

Cucumber is a family of Cucurbitaceae and can be a source of natural antioxidants because it contains vitamin C and flavonoids that can break free radical reactions. In addition, cucumber can be used for treatment, namely to lower blood pressure, cure jaundice, facilitate urination, maintain bone health, thrush, anti-cancer, prevent dehydration and destroy kidney stones (Febriani et al., 2021).

Some studies related to lowering blood pressure are research conducted by Christine (2021) with the research title "the effect of giving cucumber juice on the blood pressure of the elderly with hypertension at PSTW Sinta Rangkang in 2020" In addition, research related to beet fruit was conducted by Nandani & Sofyaningsih (2019) with the research title "The effect of giving beet juice on blood pressure in hypertensive patients" with the results of the study that there was an effect on systolic and diastolic blood pressure before and after consuming cucumber juice and there was a decrease in blood pressure after being given a red beet juice intervention for 7 days. And there is also research related to lowering blood pressure.

Based on interviews conducted on December 3, 2023, in Drien Tujoh Village, mothers do not routinely take medication because they find it inconvenient to visit the health center. When their high blood pressure flares up, they often consume cucumber juice, celery juice, star fruit juice, or a combination of beetroot and pineapple juice. They prefer these juices over medication because they find them more palatable.

2. RESEARCH METHOD

The type of research used in this study is quantitative research with a two group pretest-posttest quasi experimental design. The study was conducted to determine the difference in giving Red Beet juice and cucumber juice to hypertensive patients in 2 different groups. The research subjects taken were all patients with hypertension in November 2023 in the Lueng Keubee Jagat Health Center working area precisely in Drien Tujoh Village, Nagan Raya Regency as many as 50 people, the sample used was 30 people with purposive sampling technique. The sample was divided into 2 groups with each sample of 15 people, namely the group given the intervention of Red Beet juice and the group with cucumber juice intervention. The independent variable is the

administration of Red Beet juice and Cucumber juice, while the dependent variable is blood pressure. This sampling is in accordance with the inclusion and exclusion criteria determined by the researcher. The data collection instruments used in this study were calibrated tensimeters, SOPs and observation sheets to determine the effectiveness comparison between Red Beet fruit juice and Cucumber fruit juice, can be known by measuring the results of respondents' blood pressure. Comparison of effectiveness between red beet fruit juice and cucumber juice can be seen from the value of significance.

3. RESULT AND DISCUSSION

3.1. Research Result

3.1.1. Description of Respondent Characteristics

Table 1. Frequency Distribution Based on Respondent Characteristics (Age, Gender, Education, Occupation) in Drien Tujoh Village, Tripa Makmur District, Nagan Raya Regency

Age Category	Frequency (f)	Percentage (%)
36-45 Years	12	40%
46-55 Years	13	43,3%
56-55 Years	5	16,6%
Gender	Frequency (f)	Percentage (%)
Male	7	23,3%
Female	23	76,6%
Education	Frequency (f)	Percentage (%)
Basic	16	53,3%
Medium	11	36,6%
High	3	10%
Jobs	Frequency (f)	Percentage (%)
Work	14	46,6%
Not Working	16	53,3%

Based on table 1 above, it can be explained that the largest percentage of age is in 46-55 years as many as 13 people (43.3%), gender with the largest percentage is female as many as 23 people (76.6%), the level of education of respondents with the largest percentage is elementary education which amounts to 16 people (53.3%). For the work of respondents with the largest percentage of respondents who did not work, namely 16 respondents (53.3%).

3.1.2. Analysis

Table 2. Effect of Beet Juice Administration on Changes in Systolic Blood Pressure in Patients With Hypertension in Drien Tujoh Village (n = 15)

	Mean	Median	Min	Max	SD
Pretest	151,87	145	140	176	11,697
Posttest	127,47	126	120	139	5,553
Decline	24,40				
P Value	0,000				

Based on table 2, the mean value of systolic blood pressure before giving Red Beet juice is 151.87 mmHg and after giving Red Beet juice is 127.47 mmHg where there is a decrease of 24.40 mmHg. The results of statistical tests using paired T-Test found that p value = 0.000 where if the p value <0.05 then there is an effect of giving Red Beet juice on the systolic blood pressure of respondents.

Table 3. Effect of Beet Juice Administration on Changes in Diastolic Blood Pressure in Patients With Hypertension In Drien Tujoh Village (n = 15)

	Mean	Median	Min	Max	SD
Pretest	92,80	89	86	120	8.809
Posttest	79,87	82	71	89	4.688
Decline	12,93				
P Value	0,000				

Based on table 3, the mean value of diastolic blood pressure before giving Red Beet juice is 92.80 mmHg and after giving Red Beet juice is 79.87 mmHg where there is a decrease of 12.93 mmHg. Statistical test results using paired T-test found that p value = 0.000 where if the P value <0.05 then there is an effect of giving red beet juice on the diastolic blood pressure of respondents.

Table 4. Effect of Cucumber juice administration on changes in systolic blood pressure in patients with hypertension in Drien Tujoh Village (n = 15)

	Mean	Median	Min	Max	SD
Pretest	145,93	143	139	169	8.075
Posttest	131,00	130	126	140	4.259
Decline	14,93				
P Value	0,000				

Based on table 4, the mean value of systolic blood pressure before giving cucumber juice is 145.93 mmHg and after giving cucumber juice is 131.00 mmHg where there is a decrease of 14.93 mmHg. The results of statistical tests using paired T-test found that the P value = 0.000 where if the P value <0.05 then there is an effect of giving cucumber juice on the diastolic blood pressure of respondents.

Table 5. Effect of Cucumber juice on changes in diastolic blood pressure in patients with hypertension in Drien Village (n = 15)

	Mean	Median	Min	Max	SD
Pretest	88.47	88	80	102	5.553
Posttest	80,80	82	75	84	2.426
Decline	7,69				
P Value	0,000				

Based on table 5, it is found that the mean value of diastolic blood pressure before giving cucumber juice is 88.47 mmHg and after giving cucumber juice 80.80 mmHg where there is a decrease of 7.69 mmHg. The results of statistical tests using paired T-test found that the P value = 0.001 where if the P value <0.05 then there is an effect of giving cucumber juice on the diastolic blood pressure of respondents.

3.2. Discussion

From the results of the study, it was found that the average age characteristics of respondents aged between 46-55 years were 13 people (43.3%). The results of this study are supported by Smeltzer & Bare (2002) who say that the aging process will cause changes in the blood vessel wall, namely the intima layer to thicken as a result of cellular proliferation and fibrosis. These changes cause vascular chaos resulting in increased peripheral pressure, impaired blood flow, and increased left ventricular workload.

Most of the respondents had the highest gender in women as many as 23 people (76.6%). The results of this study are supported by Tri Wulandari et al (2019) Although it is known that women and men have the same potential to suffer from hypertension, women are more likely to have hypertension due to hormonal disorders. The hormonal disorder is the estrogen hormone, which changes during menopause.

The results showed that the most educational characteristics were at the elementary level as many as 16 people (53.3%). Knowledge itself is influenced by formal education factors. Knowledge is closely related to education, where it is expected that with higher education, the person will have wider knowledge. However, it needs to be emphasized, it does not mean that someone with a low education is absolutely low knowledge as well.

The results showed that the most work characteristics were found in respondents who did not work, namely 16 people (53.3%). This is supported by research conducted by Marleni (2020) Light physical activity independently affects the occurrence of hypertension. The lighter the physical activity, the higher the risk of hypertension. Regular physical activity helps improve overall heart efficiency. Those who are physically active generally have lower blood pressure and are less likely to have high blood pressure. Those who are physically active tend to have better muscle and joint function, as these organs are stronger and more flexible. And in his research it was stated that there was a relationship between physical activity and the incidence of hypertension.

The results of research conducted on 15 respondents who received intervention with Red Beet juice, the average systolic blood pressure before the intervention was 151.87 mmhg and the diastolic was 92.80 mmhg while after the intervention the average systolic blood pressure dropped to 127.47 mmhg and the diastolic dropped to 79.87 mmHg.

The results of this study are in line with research conducted by Nandani & Sofyaningsih (2019) that there is a significant effect on blood pressure between before and after consuming Red Beet juice which can reduce systolic blood pressure by 10.41 mmHg and diastolic blood pressure by 8.94 mmHg. This is because beetroot contains fiber which can affect blood pressure. If fiber intake is low, it can cause obesity which also affects blood pressure. Low fiber intake results in less bile acid excreted in the feces so that a lot of cholesterol is absorbed from the remaining bile. The more cholesterol circulates in the blood, the greater the accumulation of fat in the blood vessels and inhibits blood flow resulting in increased blood pressure (Thomson et al., 2011).

The results of interviews with respondents after giving beet juice for 3 consecutive days, some of them said they felt calm, the pain in the nape of the neck that is often felt when blood pressure rises were reduced and even the respondents felt fresher after consuming Beet Fruit Juice. The results of this study also show that beet juice has a positive effect on blood pressure and is effective for lowering or controlling blood pressure to remain stable in hypertensive patients.

Based on the results of research conducted on 15 respondents who received an intervention with cucumber juice for 3 days, the average systolic blood pressure before the intervention was 145.93 mmhg and diastolic 88.47 mmhg while after the intervention the average systolic blood pressure dropped to 131.00 mmhg and the diastolic dropped to 80.80 mmHg. This is supported by research from Tjahnani (2022), namely there are differences in blood pressure before and after giving cucumber juice, this is because cucumber fruit has hypotensive properties (lowers blood pressure), because the water and potassium content in cucumber will draw sodium into the instracellular and open blood vessels (vasodilation) which can function to reduce high blood pressure. This is reinforced again from research conducted by Daulay (2020) entitled Giving Cucumber Juice to Lower Blood Pressure in Hypertension Patients in Manunggang Jae Village, Southeast Padangsidimpuan District, Padangsidimpuan City, the results of the research analysis found that 80% of hypertensive patients studied experienced a decrease in blood pressure after being given Cucumber juice invertention.

The results of interviews with respondents showed that respondents felt more comfortable, more relaxed and refreshed, neck pain was reduced, and blood pressure decreased significantly in hypertensive patients. This shows that the content in cucumber can affect blood pressure, and continuous intake can control blood pressure, and magnesium has a calming effect on the body, can reduce neck tension and reduce neck tension. Respondents' impressions.

Based on the analysis that the research has been conducted in the Lueng Keubeu Jagat Health Center Work area, November 2023 with a total of 30 respondents divided into 2 intervention groups, the p value of pre and post systolic pressure in the Beet group is 0.000 and pre and post diastolic is 0.000, while in the cucumber group pre and post intervention systolic is 0.000 and diastolic pre and post intervention is 0.000. So it is concluded that the p value of each intervention group is 0.000. So it is concluded that the p value of each group <0.05, so statistically there is a difference in giving beet juice and cucumber juice to the blood pressure of hypertensive patients in Drien Tujoh Village which is the working area of the Lueng Keubeu Jagat Health Center, Tripa Makmur District, Nagan Raya Regency.

4. CONCLUSION

There is a difference in blood pressure before and after beet juice intervention (pre intervention systolic 151.87 mmhg and diastolic 92.20 mmhg; post intervention systolic blood pressure 127.47 mmhg and diastolic 79.87; p value < 0.05). There was a difference in blood pressure before and after cucumber juice intervention (pre intervention systolic 145.93 mmhg and diastolic 88.47 mmhg; post intervention systolic blood pressure 131.00 mmhg and diastolic 80.80; p-value <0.05).

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