The Effect of Fruit Intake on Blood Pressure Reduction in Hypertensive Patients in Paya Bujok Beuramo Village, Indonesia

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DOI: 10.22178/pos.91-6

LCC Subject Category: L7-991

Received 28.03.2023
Accepted 28.04.2023
Published online 30.04.2023

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Abstract. Hypertension is one of the non-communicable diseases that has become a serious health problem today. The high incidence of hypertension often results in death. Watermelon and starfruit are two food sources rich in potassium and very good for lowering blood pressure. This study aims to determine the effect of fruit intake on blood pressure reduction using a quasi-experimental research design involving two intervention groups. The study sample consisted of 30 hypertensive patients, where 15 were given watermelon juice, and 15 were given starfruit juice. The juice was made from 200 grams of watermelon and starfruit without adding water or sugar. The research was conducted in August in Paya Bujok Beuramo Village, West Langsa District, Indonesia. The results showed that in the independent t-test, there was an effect of fruit intake (watermelon and starfruit juice) on blood pressure reduction, with a value of $p < 0.05$. In the Pair t-test, there was a reduction in systolic blood pressure with an average decrease of 9.20 ± 6.17 mmHg and diastolic pressure by 5.73 ± 3.35 mmHg in hypertensive patients who were given watermelon juice.

Meanwhile, in hypertensive patients who were given starfruit juice, there was a reduction in systolic blood pressure with an average decrease of 4.80 ± 1.94 mmHg and a diastolic pressure of 4.07 ± 1.95 mmHg. Watermelon juice was more effective in lowering blood pressure in hypertensive patients than starfruit juice. Therefore, watermelon juice is expected to be an alternative treatment that hypertensive patients can consume.

Keywords: Watermelon Juice; Carambola; Hypertension.

INTRODUCTION

Hypertension is the leading cause of cardiovascular disease and premature death worldwide. Hypertension has increased, especially in low- and middle-income countries [1]. Every year, 9.4 million deaths worldwide are caused by hypertension, which remains the most significant contributor to the global burden of disease and death [2]. It is estimated that hypertensive patients will increase to 1.6 billion by 2025 [3]. In Indonesia, hypertension is the third leading cause of death after stroke and tuberculosis, accounting for 6.7% of deaths in Indonesia's population of all ages. Hypertension is characterized by an increase in the narrowing of the arterial blood vessels, resulting in obstruction of blood flow and an increase in blood pressure in the blood vessels [4]. Hypertension is a chronic disease that requires optimal control, especially among older individuals, to reduce the risk of cardiovascular disease [5]. Hypertension increases the likelihood of developing kidney and cardiovascular disease, nervous system disorders and retinopathy. Lifestyle factors such as lack of physical activity, smoking, alcohol consumption, and high sodium intake, while low intake of vegetables and fruits can also contribute to hypertension [6]. According to the Basic Health Research of 2013, the prevalence of hypertension in Aceh province was 21.5%. The majority of hypertension tends to be higher among individuals with lower levels of education and those who are unemployed [7]. The profile of Langsa Barat Community Health Center in 2017 showed that 147 hypertensive patients visited the centre. From January to March 2018, 632 hypertensive patients visited the centre, including those from Paya Bujok Beuramo village [8].

One alternative to treating hypertension is by consuming fruits and herbal plants. Some fruits,

such as watermelon and starfruit, can lower blood pressure. Medically, watermelon and starfruit contain high levels of potassium, where 100 grams of watermelon contains 112 mg of potassium, and 127 grams of starfruit includes 207 mg of potassium [9]. Potassium functions to increase the concentration in intracellular fluid, thereby tending to draw fluid from extracellular parts and stimulate the excretion of sodium through urine, resulting in a decrease in blood pressure [10]. Several risk factors for hypertension are obesity, unhealthy eating patterns, lack of physical activity, and smoking habits. Studies show that consuming fruits can help lower blood pressure and prevent hypertension. Several studies have examined the effect of fruit intake on reducing blood pressure in hypertensive patients [11]. These studies show positive results on using fruits as an alternative to treat hypertension. However, there are still many factors to consider in providing fruit intake to hypertensive patients, such as the type of fruit consumed, the amount of fruit given, the duration of information, and possible side effects [12].

Therefore, further research is needed to obtain more detailed information on the effect of fruit intake on reducing blood pressure in hypertensive patients and to obtain more accurate recommendations for hypertension treatment. Therefore, this study aims to analyze the impact of fruit intake on lowering blood pressure in hypertensive patients in the village of Paya Bujok Beuramo.

MATERIAL AND METHODS

The research design used in this study was quasi-experimental with a pre-post-test design without a control group using two groups, namely the first intervention group and the second intervention group. The study was conducted in Paya Bujok Beuramo Village, West Langsa District, in August 2018. Watermelon and star fruit, weighing 200 g, were made into juice without any mixture. Blood pressure was measured before the juice was given, and measurements were taken after 20 minutes of juice consumption. The sample size of this study was 30 people, with 15 participants in the watermelon juice intervention group and 15 in the star fruit juice intervention group. The inclusion criteria were having systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg, not consuming antihypertensive drugs, having no comorbidities, being willing to participate in the study, and being able to communicate. The study subjects were taken through purposive sampling. The inferential test used was the parametric statistical test, namely paired t-test, to determine the difference in blood pressure before and after the consumption of watermelon and star fruit juice, as well as the independent t-test to determine the difference in blood pressure between the watermelon juice group and the star fruit juice group.

RESULTS AND DISCUSSION

Descriptive Statistics. Watermelon Juice Intervention. Based on Table 1 shows that the majority of hypertensive patients who were given watermelon juice were aged > 50 years (53.3%), dominated by females (93.3%) with a primary school educational background (73.3%), and most of them were housewives (86.7%).

Table 1 – Frequency Distribution of Hypertensive Patients Given Watermelon Juice

Variable	Frequency	%
Age		
< 40 years	3	20,0
40 – 50 years	4	26,7
50 years	8	53,3
Gender		
Man	1	6,7
Woman	14	93,3
Education		
Elementary school	11	73,3
Junior High School	3	20,0
Senior High School	1	6,7
Work		
Housewife	13	86,6
Trader	1	6,7
Seamstress	1	6,7
Total	15	100

This study also indicates that most hypertensive patients have a primary school education background, meaning their understanding and knowledge about hypertension could be much higher. Furthermore, the study results also demonstrate that hypertension is more commonly found in homemakers due to their complex role as homemakers, where their daily activities at home are higher.

Giving Starfruit Juice. Based on Table 2 shows that in hypertensive patients who were given starfruit juice, the majority were aged > 50 years (66.7%), predominantly female (93.3%), with a background of primary school education (66.7%), and the majority of them worked as housewives (80.0%).

Table 2 – Frequency Distribution of Hypertension Patients Given Starfruit Juice

Variable	Frequency	%
Age		
< 40 years	2	13,3
40 – 50 years	3	20,0
50 years	10	66,7
Gender		
Man	1	6,7
Woman	14	93,3
Education		
Elementary School	10	66,6
Junior High School	4	26,7
Senior High School	1	6,7
Work		
Housewife	12	80,0
Trader	1	6,7
Seamstress	2	13,3
Total	15	100

Inferential Statistics. Independent t-test. Based on Table 3, it can be seen that the systolic and diastolic blood pressure before the administration of watermelon juice and starfruit juice showed a significant value of >0.05, but for systolic and diastolic blood pressure after the administration of watermelon juice and starfruit juice showed an essential value of <0.05.

Table 3 – Independent T-test

Parameters	N	mean ± s.b	Difference in mean	P
Systolic blood pressure Before Giving Watermelon Juice Provision of Starfruit Juice	15 15	153,53 ± 9,96 159,27 ± 15,14	-5,73	0,232
Systolic blood pressure Before Giving Watermelon Juice Provision of Starfruit Juice	15 15	98,60 ± 6,28 95,53 ± 4,85	-3,07	0,146
Systolic blood pressure After Giving Watermelon Juice Provision of Starfruit Juice	15 15	144,33 ± 12,52 154,47 ± 14,16	-10,13	0,047
Systolic blood pressure After Giving Watermelon Juice Provision of Starfruit Juice	15 15	89,80 ± 6,35 94,53 ± 5,81	-4,73	0,042

Paired t-test. Table 4 shows that the systolic and diastolic blood pressure before giving watermelon juice and starfruit juice shows a significant value of> 0.05.

Table 4 – Paired T-test

Parameters	Giving Watermelon Juice, mean ± s.b	Provision of Starfruit Juice, mean ± s.b
Systolic blood pressure Before After P	153,53 ± 9,96 144,33 ± 12,52 0,000	162,07 ± 15,34 158,60 ± 15,87 0,000
Systolic blood pressure Before After P	95,53 ± 4,85 89,80 ± 6,35 0,000	98,60 ± 6,28 94,53 ± 5,81 0,000

Still, the systolic and diastolic blood pressure after passing watermelon juice and starfruit juice offers a discount of < 0.05. This indicates a significant difference in systolic and diastolic blood pressure before and after giving watermelon and starfruit juice (p < 0.05). Furthermore, it can be inferred that watermelon juice lowers blood

pressure faster than starfruit juice. The independent t-test results of the measurement of blood pressure in hypertensive patients who were given watermelon juice and starfruit juice in Paya Bujok Beuramo Village, Langsa Barat Subdistrict, showed that before being given watermelon juice and starfruit juice, systolic blood pressure (p=0.323) and diastolic blood pressure (p=0.323) showed a significant value > 0.05, indicating that there was no difference in the mean systolic and diastolic blood pressure before being given watermelon juice and starfruit juice. However, after being given watermelon juice and starfruit juice, systolic blood pressure (p=0.047) and diastolic blood pressure (p=0.042) showed a significant value < 0.05, indicating that there was a difference in the mean systolic and diastolic blood pressure after being given watermelon juice and starfruit juice. To determine the difference in mean blood pressure before and after being given watermelon juice and starfruit juice, a paired t-test was conducted. The research results show a decrease in systolic blood pressure with an average reduction of 9.20 ± 6.17 mmHg and diastolic blood pressure of 5.73 ± 3.35 mmHg in hypertensive patients who were given watermelon juice. Similarly, in hypertensive patients who were given starfruit juice, there was a decrease in systolic blood pressure with an average reduction of 4.80 ± 1.94 mmHg and diastolic blood pressure of 4.07 ± 1.95 mmHg.

The research results indicate that watermelon and starfruit juice consumption can lower blood pressure. However, watermelon juice is more effective in reducing blood pressure than starfruit juice, making it a potential alternative treatment for hypertensive patients. These findings were supported by statistical tests, which showed that the independent t-test revealed a significant effect of fruit intake (watermelon and starfruit juice) on blood pressure reduction with p<0.05. Additionally, the Paired t-test showed a decrease in systolic blood pressure by an average of 9.20 ± 6.17 mmHg and diastolic blood pressure by 5.73 ± 3.35 mmHg in hypertensive patients given watermelon juice and a reduction in systolic blood pressure by an average of 4.80 ± 1.94 mmHg and diastolic blood pressure by 4.07 ± 1.95 mmHg in hypertensive patients given starfruit juice. The results of the above study are consistent with several previous studies that have reported significant reductions in systolic and diastolic blood pressure in hypertensive patients given red beet juice for 14 days. These findings are supported by decreased plasma angiotensin-converting enzyme (ACE) levels in the group given red beet juice. Red guava fruit given regularly for four weeks can significantly lower blood pressure in hypertensive patients.

There was also a decrease in cholesterol and blood glucose levels in the group given red guava fruit. Tomato juice given for four weeks can significantly reduce blood pressure in hypertensive patients. There was a decrease in systolic and diastolic blood pressure in the group given tomato juice. Red dragon fruit given for eight weeks can lower blood pressure in hypertensive patients. There was a decrease in systolic and diastolic blood pressure in the group given red dragon fruit. Papaya juice given for four weeks can significantly lower blood pressure in hypertensive patients. There was a decrease in systolic and diastolic blood pressure in the group given papaya juice. Mango juice given for four weeks can significantly reduce blood pressure in hypertensive patients. There was a decrease in systolic and diastolic blood pressure in the group given mango juice. Red apples given for eight weeks can significantly lower blood pressure in hypertensive patients. There was a decrease in systolic and diastolic blood pressure in the group given red apple.

Based on the research results in Paya Bujok Beuramo village, it can be concluded that consuming fruits can positively affect reducing blood pressure in hypertensive patients. Several fruits, such as red beet, red guava, tomato, dragon fruit, papaya, and mango, can help lower systolic and diastolic blood pressure in hypertensive patients.

Recommendations for further research include exploring other types of fruits that can potentially lower blood pressure in hypertensive patients. In addition, further analysis can be conducted with a larger sample population and longer study duration to obtain more significant and scientifically accountable results.

It is also recommended to increase public awareness of the benefits of fruits for health, especially in hypertensive patients. This can be done through education and health campaigns involving the community and local healthcare professionals. With a better understanding of the importance of fruit intake, it is hoped that the community can improve their diet and reduce the risk of hypertension and other cardiovascular diseases.

CONCLUSIONS

Statistically significant differences were observed in the mean systolic and diastolic blood pressure between hypertensive patients who received watermelon juice and those who received starfruit juice. These findings suggest that fruit intake (watermelon and starfruit juice) can reduce blood pressure among hypertensive patients in Paya Bujok Beuramo Village, Langsa Barat District. Notably, watermelon juice was more effective than starfruit juice in lowering blood pressure in hypertensive patients.

Conflict of interest

The authors declare no conflict of interest.

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