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Consumption of High Potassium Vegetable Types Associated with Hypertension Levels in the Elderly at the Dau Health Center

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ABSTRACT

Introduction: Hypertension in the elderly is one of the growing global health problems. One of the influencing factors is the low consumption of vegetables high in potassium. This study aims to determine the relationship between consumption of high potassium vegetable types and the level of hypertension in the elderly.

Methods: This study used a cross sectional design. Participants consisted of 44 elderly people with hypertension who were selected by accidental sampling technique from the elderly population who routinely conduct health checks at the first level health service facility. Inclusion criteria are elderly who have been diagnosed with hypertension and are willing to become respondents, while exclusion is elderly with communication disorders. The instrument used was a modified Food Frequency Questionnaire (FFQ), while a tensimeter was used to measure blood pressure. Data analysis was performed using the Spearman rho test.

Results: Most respondents (65.9%) had high potassium vegetable consumption in the sufficient category. The majority of elderly people experienced prehypertension and stage 1 hypertension, each as much as 43.1%. The results of the analysis showed that there was a significant relationship between consumption of high potassium vegetable types and the level of hypertension in the elderly (p-value = 0.000; r = -0.253).

Conclusion: Elderly people who have adequate vegetable consumption are associated with blood pressure problems. This study suggests the need for further research on the amount and portion of vegetable consumption and the use of more accurate food recording methods.

Keywords: Elderly; Hypertension; High Potassium Vegetables

INTRODUCTION

Elderly (elderly) is someone who has more than 55 years of age (WHO, 2023). At this stage, of course, a person usually experiences a gradual decline in various aspects, namely mental, physical and social. A decline also occurs in the ability of tissues to replace/maintain various normal functions, resulting in a weakened ability to ward off infection and the ability to repair the body (WHO, 2018). These conditions have an impact on the continuous increase in hypertension cases. This condition is caused by physiological changes that occur in various organs of the body, especially the circulatory system, one of which is stiffness in the arteries so that blood pressure tends to increase, besides that mental health such as thinking and remembering abilities begin to decline so that it affects the compliance of taking elderly drugs compared to young age (Huriah, 2019)

The World Health Organization (WHO) notes that around 1.13 billion people experience hypertension (WHO, 2023). Data from the Indonesian Ministry of Health (2023) shows that the number of people with hypertension in Indonesia in the elderly is 34.1% with a total of 91.729 million people of the total Indonesian population of 269 million. While the number of elderly people with hypertension in East Java in 2023 amounted to 375,127 people (Kemenkes RI, 2023). According to the Malang Regency Health Profile in 2019 elderly people with primary hypertension were 59,312 people (Dinas Kesehatan Kabupaten Malang, 2024). Patients with hypertension in the elderly at the Dau Malang Health Center during the last 6 months, namely January-July 2024, reached 620 cases (Dinas Kesehatan Kabupaten Malang, 2024). In addition, research by Putri et al., (2018) found that the average hypertension in Bantul Regency was at the level of stage 1 hypertension and stage 2 hypertension (140-179 mmHg / 90-109 mmHg). Hypertension is systolic blood pressure equal to or above 140 mmHg and or diastolic blood pressure equal to or above 90 mmHg (WHO, 2023). As age increases, it will increase the risk of increasing blood pressure and have an impact on health decline(Kadir, 2019).

The elderly are prone to hypertension because the function of organs in the elderly will decrease, the older the age, the blood pressure tends to increase. Elderly people who experience hypertension, but are not treated properly, have an impact on the occurrence of disease complications such as heart disease, stroke, and kidney failure (Kemenkes RI, 2019). According to Adriaansz et al., (2016) the elderly who have a poor diet can affect the increase in blood pressure so that it can cause hypertension and reduce their health status. So that one of the actions to reduce blood pressure is to consume vegetables high in potassium. Various ways to reduce blood pressure are through pharmacology and non-pharmacology, for pharmacology can be done by consuming high-potassium vegetables. Supported by the results of research conducted by Adriaansz et al., (2016) stated that consuming high-potassium vegetables helps dilate blood vessels and lose water from the body is the result of potassium pump activity so that it can lead to vascular resistance. The low consumption of high-potassium vegetables is also a cause of hypertension, supported by the results of Hidayat (2022) which proves that insufficient consumption of vegetables can affect the increase in blood pressure because the content in vegetables helps increase cholesterol expenditure so that it can reduce hypertension. In line with Yasril & Rahmadani (2020) revealed that fiber intake helps in the elimination of feces, also reduces energy intake, avoids obesity, and reduces hypertension. Consumption of dietary fiber serves to reduce the risk of cardiovascular disease, ward off toxins, increase stool volume, and stimulate the growth of good microbes (Oktaria et al.,2023). So that vegetable consumption is very important and

highly recommended for the elderly, especially in the elderly who are at risk of having high blood pressure. Food consumption is considered a risk factor for hypertension, so WHO recommends that people increase their intake of vegetables and fruits, limit sodium, reduce sugar, salt, coffee, liquor, and try to manage stress to keep blood pressure under control (Afriani et al., 2023).

The phenomenon that occurs is that the consumption of vegetables high in potassium is still relatively low among the elderly, this condition certainly has an impact on the health of the elderly which can cause health problems, one of which is an increase in high blood pressure. Supported by Adriaansz et al., (2016) stated that eating vegetables high in potassium can help reduce blood pressure by a percentage of 45%. In line with research by (Imelda et al., 2020) said that there were most respondents who had a level of vegetable consumption that was classified as less, namely 36%. With the results of research conducted by Aprilla (2021) , it shows that the average elderly vegetable consumption is still relatively low with a percentage of 50% where in one day the elderly only consume 3-4 servings of vegetables per day where it should be recommended that the elderly consume 4-5 servings of vegetables / day or 3,900-4,700 mg per day. Supported by Farhat &Yanti (2021) states that there are most respondents, namely 67.3% of elderly people who do not consume enough vegetables, this condition certainly affects the health of the elderly. Consumption of types of vegetables that are low in potassium is closely related to the incidence of hypertension. This is because low potassium consumption is related to the incidence of hypertension. Hypertension or high blood pressure is caused by a lack of potassium intake. The mechanism of action of potassium in preventing narrowing of blood vessels (atherosclerosis) is by keeping the walls of arterial blood vessels elastic and optimizing their function so that they are not easily damaged by high blood pressure (Ramadhan et al., 2022). In hypertensive elderly conditions with high potassium vegetable consumption can affect fluid balance in the body. If the body lacks potassium, it experiences muscle weakness, cramps, and cognitive problems such as confusion. The importance of research is raised, if it is proven that consumption of high potassium vegetable types is related to the level of hypertension, the elderly can be recommended to increase consumption of vegetables that are high in potassium.

Based on the results of preliminary studies, there are 10 elderly people at Puskesmas Dau through blood pressure checks, 8 people have high blood pressure, namely 4 people experiencing stage 1 hypertension 140-159 mmHg and as many as 4 people experiencing stage 2 hypertension 160-179 mmHg, while the other 2 people have normal blood pressure 120-129 mmHg. From the results of interviews from 10 elderly people, 8 elderly people rarely consume vegetables because they are not used to eating vegetables and rarely provide vegetable stocks at home while the other 2 people like to consume vegetables such as cassava leaves and young jackfruit. The purpose of this study was to determine and analyze the relationship between consumption of high potassium vegetable types with the level of hypertension in the elderly at Puskesmas Dau.

METHOD

This research method uses a quantitative approach with a correlational design that is cross sectional, namely data collection is carried out at one time to determine the relationship between consumption of high potassium vegetable types with the level of hypertension in the elderly. The study was conducted at Puskesmas Dau Malang City, East Java on April 8, 2025, with a population of elderly hypertensive patients who regularly visit an average of 66 people. The sample was taken as many as 44 people using accidental sampling technique with the inclusion criteria

of elderly women aged ≥55 years, routine control and consumption of drugs, and willing to become respondents. The independent variable in this study was the consumption of high potassium vegetable types, while the dependent variable was the level of hypertension. The research instruments included a high-potassium vegetable questionnaire to measure vegetable consumption and a digital tensimeter to measure blood pressure, the results of which were recorded in an observation sheet. Data were analyzed to see the relationship between the two variables by considering the ordinal scale and measurement categories according to the Indonesian Ministry of Health standards. Bivariate analysis using the Spearman Rho test showed a significant relationship between consumption of high potassium vegetable types and the level of hypertension in the elderly, with a p-value of 0.000 ($p < 0.05$).

RESULTS

Table 1. showed that most of the elderly (54.5%) are aged 55-65 years, almost half of the elderly (36.3%) have nutritional status in the overweight category, most of the elderly (56.8%) have the last education of elementary school, most of the elderly (61.3%) have housewife workers, most of the elderly (61.4%) regularly exercise, most of the elderly (59. 0%) exercise, one of which is walking, almost all of the elderly (86.4%) have a cause of stress is health, most of the elderly (59.0%) consume salted fish, almost all of the elderly (86.3%) have a history of using injectable hormonal birth control, and almost all (90.9%) have an income below the Malang Regency regional minimum wage (Rp <.3,500,000).

Based on Table 2. shows that most of the elderly 29 (65.9%) have sufficient consumption of high potassium vegetable types. All respondents have a history of hypertension. The majority of elderly people experience hypertension with the highest composition in stage 1 and 2 hypertension, 19 people each (43.1%).

Tabel 1. Frequency distribution of general data characteristics

Characteristics	Category	n	%
Age (year)	55-65	24	54.5
	66-75	16	36.3
	>75	4	9.0
Nutritional Status (BMI)	Less	5	11.3
	Normal	19	34.5
	Obesity	20	36.3
Education	SD	25	56.8
	SMP	8	18.1
	SMA	4	9.0
	D1	1	2.2
	S1	3	6.8
	S2	1	2.2
	S3	2	4.5
Job	Housewife	27	61.3
	Farmers	3	6.8
	Self-employed	7	15.9
	Privat	1	2.2
	Retired	4	9.0
	Lecturer	1	2.2
	Teacher	1	2.2
Sport	Yes	27	61.4
	No	17	38.6
Type of sport	Never	17	38.7
	Walking	26	59.0
	Gymnastics	1	2.3
Causes of stress	Never	5	11.4
	Health	38	86.4
	Family	1	2.2
Salted fish consumption	Never	18	40.9
	Consumption	26	59.0
History of Hormonal Birth Control Use	Never	1	2.2
	Injection	38	86.3
	Pills	1	2.2
	Implants	4	9.0
Income per month	Above UMR	4	9.1
	Below UMR	40	90.9
Total		**44**	**100**

Based on Table 2, the results of cross tabulation obtained that the elderly who have sufficient consumption of vegetable types amounted to 65.9% with pre-hypertension blood pressure 43.1% and stage 1 hypertension 43.1% and stage 2 hypertension 13.6%. The

Table 2. Consumption Frequency of High Potassium Vegetable Types and Hypertension Level

Variable	n	%
Vegetable Comsumption		
Less	14	31.8
Enough	29	65.9
Good	1	2.2
Hypertension Level		
Prahypertension	19	43.1
Stage 1	19	43.1
Stage 2	6	13.6
Total	**44**	**100**

results of the analysis using Spearmen Rho obtained that there is a relationship between consumption of high potassium vegetable types with the level of hypertension in the elderly at Puskesmas Dau (p-value: 0.000), with the strength of the relationship (r = -0.253) which means that the higher the consumption of vegetables containing potassium, the lower the level of hypertension.

DISCUSSION

Identification of consumption of high potassium vegetables in the elderly

The results of this study indicate that the majority of elderly participants reported a moderate habit of consuming high-potassium vegetables. However, certain local high-potassium vegetables such as genjer, kecipir (winged bean), and jengkol were consumed less frequently. Several main factors appear to influence this pattern including knowledge, income, economic constraint, and preference.

Knowledge, as a cognitive determinant of dietary behavior, plays a crucial role in the elderly's decision-making process related to food choices. In this study, it was found that most elderly individuals had only completed elementary school. Low educational attainment is commonly associated with reduced food literacy, including limited access to accurate and updated nutritional information (Silva, 2023). Educational history directly shapes cognitive frameworks and openness to health promotion messages, as individuals with minimal schooling often lack the foundational knowledge needed to interpret and apply dietary guidelines (WHO, 2023). This condition potentially limits their understanding of the health benefits of high-potassium vegetables, especially for managing hypertension and maintaining cardiovascular health. elderly individuals with higher levels of nutritional knowledge are more capable of developing positive perceptions, attitudes, and behaviors in making food-related decisions. between knowledge and dietary patterns among elderly individuals with hypertension in Tasikmalaya, showing that informed elders were more likely to consume foods beneficial.

This finding is supported by Yusnita (2024), who reported a significant association

Table 3. Description of the Relationship between Consumption of High Potassium Vegetable Types with Hypertension Levels in the Elderly at Puskesmas Dau

		Degree of hypertension						Total		P-value	r
		Pre-HT		HT 1		HT2					
		n	%	n	%	n	%	f	%		
Consumption of High Potassium Vegetable Type (X)	Less	6	13.6	8	18.2	0	13.6	14	31.8	0.000	-0.253
	Enough	13	29.6	11	27.3	5	29.6	29	65.9		
	Good	0	0	0	0.0	1	0	1	2.2		
	Total	19	43.1	19	43.1	6	13.6	44	100		

for blood pressure regulation. Therefore, enhancing the elderly's knowledge through targeted health education initiatives, community nutrition programs, and regular counseling by community health nurses is strongly recommended as a preventive measure.

In addition to knowledge, income was identified as another critical determinant. This study found that a considerable portion of the elderly population earns below the regional minimum wage, significantly affecting their purchasing power. Low-income households are often forced to prioritize cost-efficiency over nutritional quality, resulting in reduced intake of nutrient-rich vegetables, including those high in potassium. This observation is in line with the findings of Baladina et al. (2024), who concluded that inadequate income limits food diversity and quantity, subsequently compromising the nutritional adequacy of meals.

Furthermore, economic constraints among the elderly often lead to dependence on cheaper, energy-dense, but nutrient-poor foods. As posited by Kaur (2023), there is an inverse relationship between income and the quality of dietary intake. Those higher-income individuals more likely to purchase and consume fruits and vegetables due to greater financial flexibility. The author supports the opinion that improving economic stability whether through social assistance, food subsidy programs, or elderly-specific economic empowerment strategies can encourage more nutritionally balanced food choices, including the consumption of high-potassium vegetables.

The lack of consumption of high-potassium vegetables may influenced by taste/preference. Elderly people will tend to consume vegetables if they prefer to certain types of vegetables. In line Rayanti et al., (2023) taste/preference makes a person's attitude to like or dislike to food. Preference for food is considered a determining factor in consuming foods including fruits and vegetables (Khairiah, 2024); Amran et al., 2010). To increase the preference for high-potassium vegetables, care giver/elderly may try different cooking methods or combining them with comfort foods. Adding natural spices or cooking in familiar dishes may help improve taste and make these healthy vegetables more appealing to consume.

Identification of Hypertension Levels in the Elderly

The results showed that almost half of the elderly had hypertension with the category of grade 1 and grade 2 hypertension with controlled normal blood pressure. Most of the elderly have hypertension which is indicated by blood pressure above 130/80 mmHg. Almost half of the elderly are 55-60 years old. Age 55-60 is the age of the late elderly where a person's blood pressure will be higher (Ministry of Health of the Republic of Indonesia, 2019). In line with Uliatiningsih & Fayasari (2019) revealed that the older a person is, the higher their blood pressure will be. This is because in old age structural and functional changes in the peripheral vascular system are responsible for changes in blood pressure that occur in old age.

The majority of elderly people experience hypertension due to gender factors. All respondents were female. Women are more at risk of developing hypertension. In line with Falah (2019) revealed that women over the age of 50 tend to experience more hypertension or higher blood pressure. The decrease in estrogen levels will reduce the HDL (High Density Lipoprotein) levels as protective factor in preventing the process of atherosclerosis (Yunus et al., 2021). Elder women can reduce the effects of menopause on blood pressure by adopting a healthy lifestyle such as consuming foods rich in fiber/high potassium, healthy fats, engaging in regular physical activity like walking or yoga, managing stress, and having regular health check-ups to monitor blood pressure and

cholesterol levels. These steps may help balance hormonal changes and support heart health.

Stress can cause a temporary increase in blood pressure due to the release of stress hormones such as adrenaline and cortisol. When a person experiences stress, the body reacts by releasing stress hormones, such as adrenaline and cortisol. These hormones increase heart rate and accelerate blood flow, which can cause an increase in blood pressure (Hidayati et al., 2022). A history of disease can also affect blood pressure, this condition is because certain diseases can affect blood pressure, both increasing the risk of hypertension (high blood pressure) because it disrupts the balance of salt and fluids in the body resulting in increased blood pressure (Zaenurrohmah & Rachmayanti, 2017). Salty food consumption factors are always recommended to be avoided by people with hypertension. This is because salty foods contain high sodium so that it will bind a lot of fluid that is flowed with blood to the heart. This condition will later burden the work of the heart, so that it can increase blood pressure (Putri, 2022).

Many elderly with hypertension related to their nutritional condition. In this study, more than half of the elderly had a normal weight. However, eating habits play a big role in this. People who eat unhealthy foods often gain weight (become obese), and this can raise blood pressure (Simanullang, 2018). Nutritional status helps us know whether our weight is ideal Author recommend, elderly people should start taking simple steps to maintain a healthy weight to prevent hypertension from getting worse. This includes eating more vegetables and fruits which were high in potassium, choosing low-salt foods, drinking enough water, and doing light physical activity like walking or stretching every day.

Analysis of the Relationship between Consumption of High Potassium Vegetable Types with Hypertension Levels in the Elderly

Based on the results of cross tabulation, it is found that the elderly who consume high potassium vegetable types in the sufficient category are related to the level of hypertension of the elderly. Degrees of hypertension 1 and 2 in the elderly are related to low consumption of high potassium vegetables. The results of the analysis using the Spearmen Rho test showed that there was a relationship between consumption of high potassium vegetable types and the level of hypertension in the elderly at the Dau Health Center (p-value: 0.000), with the strength of the relationship being inversely weak, the higher the consumption of vegetables containing potassium, the lower the level of hypertension. Hypertension is systolic blood pressure equal to or above 140 mmHg and or diastolic blood pressure equal to or above 90 mmHg (WHO, 2023). In elderly hypertension who regularly consume drugs will have controlled blood pressure (Silvianah & Indrawati, 2024). Consumption of high potassium vegetables can reduce blood pressure (Farhat &Yanti, 2021).

The finding was in line with statement of Indonesian Ministry of Health (2020): vegetable consumption for the elderly as much as 4-5 servings per day. Adequate potassium intake for the elderly is 3,900-4,700 mg per day, where the main role of potassium in the body is to help maintain normal fluid levels in cells (Putri et al., 2018). Muscle weakness, cramps, and cognitive problems such as confusion may occurs in the condition of hypokalemia. In line with research by Imelda et al., (2020) said that there were most respondents who had a relatively low level of vegetable consumption consumption which resulted in an increase in blood pressure. But besides that, consuming vegetables that are varied and high in potassium has an impact on

health, one of which is lowering blood pressure in the elderly.

The use of birth control also affects blood pressure, this condition is due to the use of hormonal contraceptives, such as birth control pills and birth control injections, can affect blood pressure. Some types of hormonal contraceptives contain estrogen, which can increase fluid and sodium retention, thus increasing blood pressure (Widyaningsih & Isfaizah, 2019). Elderly women especially those with a history of long-term hormonal contraceptive use should regularly monitor their blood pressure and consult healthcare providers about safer alternatives. Author recommend to reduce salt intake, stay physically active, and maintain a balanced diet high in fiber and low in saturated fat may help minimize the long-term impact of hormonal contraceptives on blood pressure.

Exercise also has a significant effect on blood pressure. Exercising regularly can help lower blood pressure, especially in people with hypertension. Regular physical activity improves cardiac efficiency, maintains blood vessel elasticity, and helps manage body weight, all of which contribute to lower blood pressure (Alim, 2012). The level of hypertension will decrease if there is an optimization of heart and blood vessel function. Elderly people should choose light to moderate exercises that are safe and effective, such as walking, tai chi, or gentle yoga, which can support heart health without putting too much strain on the body. When combined with a balanced diet rich in vegetables—especially those high in potassium like spinach, broccoli, and sweet potatoes—this lifestyle can significantly help control blood pressure and improve overall well-being.

Research by Kamila et al., (2024) shows that eating vegetables is very important for maintaining the flexibility and elasticity of blood vessels, preventing narrowing, and helping blood pressure work properly. Similarly, Adriaansz et al., (2016) found that eating vegetables high in potassium can reduce blood pressure by up to 45%. Kamila et al., (2024) and Susanti et al.,(2017) also stated that vegetable consumption is potential to maintain the elasticity and flexibility of blood vessels due to antioxidant component. To increase elderly people's preference for eating healthy vegetables, families or caregivers can prepare vegetables in more appealing ways. In Indonesian culture, dishes like *sayur asem*, *sayur bening bayam*, *urap*, *pecel*, or *tumis kangkung* are not only familiar but also nutritious. These dishes can be adjusted to use less salt and oil to suit hypertensive needs. Caregivers and families can also involve elderly individuals in cooking or choosing their preferred vegetables to make the experience more personal and enjoyable. Adding a variety of colors, textures, and flavors using local herbs or traditional spices can also improve taste and make vegetable dishes more appealing.

The importance of high-potassium vegetable consumption can help lower cholesterol and fat, someone who consumes enough high-potassium vegetables will get enough of most micro minerals and fiber that can prevent the accumulation of cholesterol and fat which results in obesity. This is because high-potassium vegetables contain vegetable fibers that can help the excretion of cholesterol through the stool. This situation is beneficial because it can reduce energy intake and obesity, and will ultimately reduce the risk of increasing cholesterol and fat which has an impact on increasing hypertension. In order for fat and cholesterol to decrease, the elderly must choose vegetables that are consumed, namely vegetables high in potassium (Farhat & Yanti, 2021).

CONCLUSION

The results of the study indicate that adequate consumption of vegetables is associated with blood pressure problems. This suggests that although potassium intake through vegetables is adequate, blood pressure in the elderly is

still influenced by other factors such as age, medication adherence, lifestyle, and medical history. It is recommended that future researchers increase the amount and frequency of potassium-rich vegetables, using appropriate dietary measurement instruments for the elderly.

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