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RELATIONSHIP BETWEEN DIET PATTERNS AND HYPERTENSION LEVELS IN THE ELDERLY

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ABSTRACT
Hypertension is a common health problem in the elderly population and is a significant risk factor for cardiovascular diseases. Dietary patterns are known to influence blood pressure control significantly, yet many elderly individuals continue to follow unhealthy eating habits that may exacerbate their condition. Objective: This study aims to determine the relationship between dietary patterns and hypertension levels in elderly individuals. Aims: This study aims to explore the relationship between dietary patterns and hypertension levels in the elderly and to analyze the distribution of hypertension based on age group and severity. Methods: This study used a quantitative approach with a cross-sectional observational analytical design. Data were collected from 45 elderly respondents through interviews using a structured dietary questionnaire and direct blood pressure measurement using a calibrated digital sphygmomanometer. Data analysis was conducted in two stages: univariate analysis to describe the characteristics of respondents and the distribution of hypertension, and bivariate analysis using the Chi-square test to assess the relationship between dietary patterns and hypertension levels. Results: The results showed that most respondents came from the 60-69 age group (88.89%), and the 70-79 age group (11.11%). Most respondents (57.8%) experienced stage I hypertension, while the rest (42.2%) experienced stage II hypertension. Bivariate analysis showed a significant relationship between diet and hypertension levels (p-value = 0.035). Respondents with a good diet tended to experience stage I hypertension (77.8%), while a poor diet was more dominant in stage II hypertension (78.9%). Conclusion: This study shows a significant relationship between diet and hypertension levels in the elderly in Bekasi City. The elderly with a good diet tend to experience stage I hypertension, while a poor diet correlates with stage II hypertension. These results indicate that diet plays an important role in the severity of hypertension in the elderly.

Keywords: dietary patterns; elderly; hypertension

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INTRODUCTION

According to Health Law No. 23 of 1992, the Ministry of Health defines health as an optimal condition that includes physical, mental, and social well-being that allows individuals to carry out daily activities without significant obstacles, including their ability to interact with the surrounding environment (Kemenkes, 2018). Diseases themselves are divided into two types, namely infectious diseases and non-infectious diseases. Non-communicable diseases (NCDs) are also known as chronic diseases that are not transmitted from person to person and have a long duration and generally develop slowly (Ri, 2018). Hypertension is one of the NCDs. Hypertension is one of the non-communicable diseases characterized by systolic blood pressure ⩾140 mmHg and/or diastolic blood pressure ⩾90 mmHg on 2 examinations with an interval of 5 minutes in a state of sufficient rest or calm. (Ansar & Dwinata, 2019; Suarayasa et al., 2023; Tika, 2021). Hypertension can cause complaints or not at all. Complaints that are often difficult to recognize or considered as normal, uncontrolled can be dangerous and cause damage to various target organs, such as hypertensive retinopathy in the eyes, coronary heart disease and congestive heart failure in the heart, chronic kidney failure if it affects the kidneys, stroke and hypertensive encephalopathy in the brain, to death. Therefore, hypertension is known as the Silent Killer (Tika, 2021).

Hypertension sufferers aged 30-79 years in the world in 2023, according to the WHO, are estimated at 1.28 billion cases. There are 46% of sufferers who do not know they have hypertension, and only 42% of sufferers are diagnosed and receive therapy. Hypertension is the leading cause of premature death in the world (Lukitaningtyas & Cahyono, 2023). According to WHO in 2021, Africa has the highest prevalence of hypertension, which is 27%, while the lowest is found in America (18%). For the Southeast Asia region, hypertension is found in 25% of cases (Handayani, 2022). Every year, there is an increase in hypertension cases. WHO also estimates that in 2025, there will be 1.5 billion hypertension sufferers and 9.5 million deaths due to hypertension and its complications (Organization, 2021; Wulandari et al., 2023)Riskesdas 2018 data shows that the prevalence of hypertension in Indonesia reached 34.11%, a significant increase from 25.8% in 2013. The estimated cases of hypertension at the national level reached 63,309,620 individuals, with a mortality rate of 427,218 cases, confirming the position of hypertension as one of the main causes of death in Indonesia (Kemenkes, 2018). At the regional level, West Java is in second place with a prevalence of 39.60%, below South Kalimantan at 44.13% and slightly above East Kalimantan at 39.30%. Specifically, Bekasi City recorded a prevalence of 28.13%. The 2020 West Java Provincial Health Profile indicated an increasing trend with a prevalence reaching 39.8%, placing hypertension as the Non-Communicable Disease (PTM) with the highest proportion in the region (Jabar, 2021). Meanwhile, at the district/city level, the 2020 Bekasi City Health Profile noted that the number of hypertension cases receiving health services in Bekasi City reached 72,189 cases. These data show that hypertension is still a major challenge in health service efforts in West Java, especially in Bekasi City (Maulidina et al., 2019). Based on age groups, SKI 2023 explains that most hypertension sufferers are aged >75 years (26.1%), followed by the 65-74 age group (23.8%), and 55-64 years (18.7%) (BKPK, 2023). Judging from these data, it can be concluded that the largest group of hypertension sufferers is the elderly (Suarayasa et al., 2023).

Referring to the Regulation of the Minister of Health of the Republic of Indonesia Number 67 of 2015 concerning the Implementation of Elderly Health Services in Public Health Centers, individuals aged 60 years and over are categorized as elderly (lansia) (Azizah et al., 2021). Research shows a positive correlation between increasing age and an increased risk of hypertension in the population. This is due to the aging process that involves a decrease in the function of various organs and body tissues, one of which is the arterial blood vessels. The structure of the blood vessel walls changes, namely thickening, becoming stiffer, the lumen becomes narrower, and its elasticity decreases, which causes a decrease in the ability of blood vessels to expand when blood passes through them. This then has an impact on increasing blood pressure (Amalia & Sjarqiah, 2022).Hypertension can be triggered by unchangeable and changeable factors. Unchangeable risk factors include age, gender, and genetic factors or a family history of hypertension. Smoking habits, physical activity or exercise, obesity, and eating patterns that include frequent consumption of high-salt foods, high-cholesterol foods, lack of fruit and vegetable intake, and alcohol are among the changeable risk factors (Siswanto et al., 2020). Diet in the elderly is an important risk factor for hypertension. Consumption of foods containing excess sodium and fat can trigger hypertension (Elivia, 2022). High salt intake causes high sodium concentrations in the extracellular fluid, which then results in water retention, increasing blood volume. The diameter of the arteries can also shrink due to excessive salt consumption.

This makes the heart work harder to pump increased blood volume through smaller than normal artery diameters, causing increased blood pressure and resulting in hypertension (Purwono et al., 2020; Zainuddin & Yunawati, 2019). Excessive fat consumption has an impact on high cholesterol levels in the blood which can settle to form plaque in the blood vessels, which is called atherosclerosis. The plaque that forms can cause narrowing of the

blood vessels and blockage of blood flow. This condition has an impact on increasing the work of the heart which then causes an increase in blood pressure (Ferencia et al., 2023; Zainuddin & Yunawati, 2019). The habit of consuming high-salt foods, fried foods as snacks, and using flavorings and coconut milk when cooking, as well as consuming eggs and tea, is commonly found in the elderly (Della Clarisa et al., 2021). Ingredients containing high sodium that are consumed by the elderly can include salted fish, milk, fried rice, fried foods, and cooking spices, such as shrimp paste, table salt, and soy sauce. A study by Pratiwi and Wibisana (2018) on the correlation of diet with hypertension levels in the elderly in Blokseger Hamlet, Tegalsari District, Banyuwangi Regency, which focused on the 55-65 year age group, produced important findings. Of the 60 respondents studied, 36 people (60%) were identified as having poor diets, with questionnaire data showing a preference for foods with high salt content. This study confirms a significant relationship between diet and hypertension levels in the elderly population (Pratiwi & Wibisana, 2018). Based on this background, this study aims to determine the relationship between dietary patterns and hypertension levels in elderly individuals. It also seeks to analyze the distribution of hypertension based on age group and severity

METHOD

Research Design

This quantitative study adopted an observational analytical approach with a cross-sectional design, using a Food Frequency Record (FFQ) questionnaire instrument. In line with the objectives to be achieved, primary and secondary data collection was carried out in one time period to analyze the relationship between food consumption patterns and the degree of hypertension in the elderly population.

Time and Place of Research

The location of this research was conducted at the Internal Medicine Polyclinic, Chasbullah Abdulmadjid Regional Hospital, Bekasi City, located at Jl. Pramuka No. 55, RT.006/RW.006, Marga Jaya, Kec. Bekasi Sel., Bekasi City, West Java 17141. The implementation time of this research will be carried out from July to August 2024.

Population and Research Sample

The population in this study were elderly hypertensive patients who were actively visiting Chasbullah Abdulmadjid Hospital in Bekasi City for control. The sample was elderly patients with hypertension who were actively checked at Chasbullah Abdulmadjid Hospital in Bekasi City in the period from July to August 2024. The samples used in this study must meet the inclusion and exclusion criteria collected using the Consecutive sampling technique (Notoatmodjo, 2005; Sugiyono, 2013).

Data Analysis

The data generated from this study will be processed with the help of SPSS 27 Software application to determine the following analysis:

1. Univariate Analysis

Univariate analysis functions to obtain an overview of the distribution of respondent characteristics and analyze each variable in elderly patients at Chasbullah Abdulmadjid Hospital, Bekasi City, which is presented in table form.

2. Bivariate Analysis

Bivariate analysis is a statistical testing method that explores the relationship between two research variables. In the context of this study, the analysis is applied to evaluate the correlation between diet and the incidence of hypertension in the elderly population. Testing is carried out using the Chi-square method, a statistical technique that compares the frequency

of observations with the expected frequency. Interpretation of the results is based on the p-value, where the relationship between variables is declared significant if the p-value <α (0.05), and vice versa, not significant if the p-value> α (0.05).

RESULT

Table 1 shows data from respondents in the 60-69 age group who experienced the most hypertension with a total of 40 respondents (88.89%), and the fewest respondents in the 70-79 age group with a total of 5 respondents (11.11%); female respondents experienced the most hypertension with a total of 27 respondents (60%) compared to males with a total of 18 respondents (40%); then respondents with a high school education level experienced the most hypertension with a total of 25 respondents (55.56%), junior high school level with a total of 10 respondents (22.22%), elementary school level with a total of 8 respondents (17.8%), and college level was the fewest respondents in this study with a total of 2 respondents (4.4%).

Table 1.
Respondent Characteristics

Characteristic	f	%
Age		
60-69 years	40	88.9
≥ 70 years	5	11.1
Gender		
Male	18	40.0
Female	27	60.0
Education		
Elementary School	8	17.8
Primary School	10	22.2
High School	25	55.6
College	2	4.4

Table 2.
The Distribution Data on Hypertension Incidence Among Respondents

Chategory	f	%
Duration of Hypertension		
1-5 years	32	71.1
> 5 years	13	28.9
History of Hypertension		
There is	38	84.4
There isn't any	7	15.6
Dietary Habit		
Good	18	40.0
Bad	27	60.0
Sodium Consumption Patterns		
Often	27	60.0
Seldom	18	40.0
Fat Consumption Patterns		
Often	28	62.2
Seldom	17	37.8
Potassium Consumption Patterns		
Often	16	35.6
Seldom	29	64.4
Hypertension Level		
Hypertension stage I	26	57.8
Hypertension stage II	19	42.2

Table 3.
Relationship between Diet Patterns and Respondents' Hypertension Levels

Dietary Habit	Hypertension Level				Total		*p-value*
	HT stage I		HT stage II				
	f	%	f	%	f	%	
Good	14	77.8	4	22.22	18	40	
Bad	12	44.4	15	78.9	27	60	0.035

Cross tabulation analysis revealed an interesting distribution among the 45 respondents. In the group with a good diet, 14 respondents (77.8%) were diagnosed with stage I hypertension and 4 respondents (22.22%) with stage II hypertension. Meanwhile, in the group with a poor diet, 12 respondents (44.4%) experienced stage 1 hypertension and 15 respondents (78.9%) with stage 2 hypertension. In statistical testing, because there was an expected count value of less than 5 in the 2x2 table, the analysis used Fisher's Exact Test as an alternative to Chi-Square. The test results showed a significance value of 0.035 ($p < 0.05$), indicating a significant relationship between diet and hypertension levels in the elderly population at Chasbullah Abdulmadjid Hospital, Bekasi City.

DISCUSSION

Characteristics of the Elderly at Chasbullah Abdulmadjid Hospital, Bekasi City

Based on univariate analysis of age characteristics, the distribution of respondents was dominated by the 60-69 year age group with a proportion of 88.89% (40 people), while the ≥70 year age group only covered 11.11% (4 respondents). This finding is consistent with the study by Mahmudah et al (Mahmudah et al., 2015) on the elderly population in Sawangan Baru Village, Depok City, which reported that the majority of respondents (73.6%) were in the early age category (60-70 years). Similar results were also reported in the study by Clarisa et al. (2021) at the Ubud I Health Center, with 64% of respondents in the 60-70 year age range (Della Clarisa et al., 2021) This pattern reinforces the understanding that increasing age is directly proportional to the tendency for increased blood pressure. The high prevalence of hypertension in the 60-69 age group indicates the accumulation of risk factors along with increasing age. The elderly period represents a phase of life characterized by a decrease in the body's adaptive capacity to various stressors. The aging process naturally results in deterioration of physical and mental functions, which manifests in decreased immunity. This condition contributes to increased susceptibility to various medical conditions, with hypertension being one of the most common clinical manifestations in the elderly population (Rahmawati et al., 2022)

Based on these findings, it can be interpreted that the age range of 60-69 years is a critical period in the development of chronic diseases, especially hypertension. At this age phase, there are significant structural and functional changes in the vascular system, especially in the form of decreased arterial elasticity, which contributes to an increased risk of cardiovascular disorders. Based on univariate analysis of gender characteristics, it revealed an uneven distribution between female and male respondents. Female respondents covered a larger proportion, namely 60% (27 people), while male respondents numbered 40% (18 people). This finding is consistent with the results of a study by Purwono et al. (2020) on the elderly population in the Gadingrejo Health Center work area, which also reported the dominance of female respondents with a proportion of 68.6% of the total hypertension sample (Purwono et al., 2020). Almost the same results were obtained from the study by Clarisa et al. (2021) where the majority of elderly hypertensive patients were women at 53.6% (Della Clarisa et al., 2021). According to Falah as quoted in Syaid et al. (2023) Identifying gender as a non-modifiable risk factor in the pathogenesis of hypertension (Syaid et al., 2023). The incidence of hypertension tends to be higher in the female population than in men, especially in the post-menopausal phase. This condition is associated with hormonal changes that increase susceptibility to blood pressure regulation disorders (Mahmudah et al., 2015)

The risk of hypertension in post-menopausal women increases up to twofold, which is closely related to the decrease in estrogen hormone levels which act as vasodilators.34 The menopause phase, which generally occurs after the age of 45 years, is marked by a significant decrease in estrogen levels which have a vital function in the regulation of High Density Lipoprotein (HDL). HDL plays an important role in maintaining blood vessel health, but increased levels can contribute to blood pressure elevation and the progression of atherosclerosis. This phenomenon explains why post-menopausal women show a more significant increase in the prevalence of hypertension compared to the male population in the same age range, with hormonal factors as the main determinant (Mahmudah et al., 2015)

Based on the results of the univariate test of educational characteristics, the majority of respondents had a high school education level, as many as 25 people (55.56%). Respondents with junior high school education were 10 people (22.22%), elementary school education was 8 people (17.8%), and college was the least, only 2 people (4.4%). Analysis of the characteristics of elderly education showed that the majority of respondents had a high school education, which can have implications for their understanding and management of health, including hypertension. Education is a key factor in a healthy lifestyle. The higher the education, the higher the level of a person's health (Rinarmi & Khatijah, 2024). The level of education has a significant correlation with the understanding of nutrition and food selection behavior. A person's capacity to absorb and implement nutritional knowledge is closely related to their level of formal education. Although education does not directly determine nutritional status, this factor plays an important role in shaping mindsets and habits that affect the fulfillment of nutritional needs. Lower levels of education may be associated with a lack of knowledge about risk factors and management of hypertension. Here is a further analysis: Low levels of education can affect their understanding of healthy lifestyles, which contributes to the level of hypertension.

Dietary Patterns in the Elderly

Evaluation of dietary patterns in the elderly at the Chasbullah Abdulmadjid Hospital in Bekasi City showed that 60% of respondents had a non-ideal diet, while the other 40% implemented a good diet. Imbalanced consumption patterns, especially related to high sodium and fat intake and low potassium, have the potential to increase the risk of hypertension. Factors contributing to this unhealthy diet include limited nutritional literacy, inappropriate habit patterns, and obstacles to accessibility to healthy food choices. This finding is consistent with the results of a study by Hamzah et al. (2021) which reported that 67.7% of respondents had an unhealthy diet, as well as a study by Mardianto et al. (2021) which identified 57.1% (16 people) of respondents with unhealthy diets compared to 42.9% (12 people) who implemented healthy diets (Akbar et al., 2025; Kurniawati, 2025).In the context of the relationship between food types and diastolic blood pressure, the study identified several food groups that had a significant influence, namely category C carbohydrates, milk, and food seasonings. Meanwhile, no significant correlation was found between diastolic blood pressure and consumption of carbohydrates A, animal side dishes A, B, C, vegetables, and fruits (Mustofa et al., 2022) This food classification is based on its specific nutritional content, where type A indicates high sodium levels, type B indicates high fat content, type C contains a combination of high sodium and fat, while type D characterizes high potassium content (Mustofa et al., 2022)

As many as 60% of respondents often consume high-sodium foods, such as biscuits consumed more than once a day. High-sodium foods can cause fluid retention, which in turn increases blood volume and blood pressure. This is especially dangerous for the elderly, who may already have cardiovascular problems (Mahmudah et al., 2015). According to research by Hakiki et al. (2023), excessive sodium consumption can induce increased cardiac output,

plasma volume, and blood pressure. This mechanism occurs through abnormal fluid retention resulting in blood volume expansion. Furthermore, excessive sodium intake can trigger adipocyte cell hypertrophy due to lipogenic processes in white fat tissue. This condition, if persistent, has the potential to cause blood vessel stenosis due to fat accumulation, which further contributes to blood pressure elevation (Hakiki et al., 2023). The high prevalence of sodium consumption in this population underscores the urgency of educational interventions regarding the health risks associated with excessive sodium intake and low-sodium food selection strategies.

The results of the analysis showed that 62.22% of respondents had a high frequency of consumption of fatty foods, especially fried foods. The saturated fat content in these foods is correlated with increased levels of low-density lipoprotein (LDL), which is a risk factor for atherosclerosis and hypertension. (Mahmudah et al., 2015). High intake of saturated fat, hydrogenated fat, and cholesterol, combined with low polyunsaturated fatty acids (PUFA), has significant implications for blood lipid profiles. Excessive fat consumption induces elevation of LDL levels, which results in plaque formation on blood vessel walls. This plaque accumulation contributes to decreased vascular elasticity and hemodynamic disorders. This diet rich in saturated fat suggests that the elderly may not be aware of the negative impact of excessive fat consumption on their heart health.Only 35.56% of respondents often consume foods high in potassium, such as bananas and eggplants. As many as 64.44% rarely consume these foods. Potassium is important for balancing the effects of sodium by helping to relax blood vessels and reduce blood pressure. Potassium deficiency worsens the effects of excess sodium. Potassium plays an important role in balancing the effects of sodium and helping to lower blood pressure (Kartika et al., 2016). Potassium deficiency can worsen the negative effects of excess sodium, so it is important for the elderly to increase potassium intake through foods such as bananas, eggplants, and green vegetables. Low potassium consumption among the elderly suggests the need for interventions to increase awareness of the importance of potassium-rich foods (Aprillia, 2020).

Diet is defined as a systematic approach to regulating nutrient intake to maintain optimal health. This concept includes three fundamental aspects: adequate intake, selection of food types, and regulation of consumption schedules (Almatsier, 2001). In the context of hypertension management, dietary modification offers a more physiological therapeutic alternative compared to pharmacological interventions. The dietary approach has advantages in terms of minimizing side effects and reducing the risk of long-term dependence on antihypertensive medication (Gowa et al., 2023). Diet selection in hypertensive patients is influenced by various complex factors, especially in terms of the type and quantity of intake. In the context of food types, a therapeutic diet includes a combination of staple foods, vegetables, side dishes, fruits, and milk. This special diet regimen is recommended for patients with clinical manifestations such as edema, ascites, and severe hypertension (Mustofa et al., 2022). The main principles in food processing include salt restriction and minimization of sodium intake. Based on observations at the Chasbullah Abdulmadjid Hospital in Bekasi City, the majority of elderly people show suboptimal eating patterns, which are characterized by an imbalance in nutrient intake. This is reflected in the high consumption of high-fat foods such as full cream milk, cheese, coconut milk, and fast food. This consumption pattern indicates a gap between actual dietary practices and therapeutic dietary recommendations for hypertension management.

Hypertension Level in the Elderly

Based on the results of the study obtained from 45 respondents who were actively treated for hypertension in the hospital. Patients received medication that was routinely taken and were educated about diet to achieve normal blood pressure targets. From this study, researchers

conducted questions through a questionnaire about diet. The results obtained were 57.78% experienced stage I hypertension, while 42.22% experienced stage II hypertension. This level of hypertension is closely related to poor diet, high sodium and fat consumption, and low potassium consumption. Stage I and II hypertension indicate that most respondents are already in the category that requires medical attention and lifestyle changes to prevent further development. The results of this study are in line with previous research conducted by Hakiki et al. (2023) who studied hypertension in the elderly in Tonjong Village, Malang, Kemuning Village in 2023 obtained results from 56 respondents, most of whom had pre-hypertension as many as 2 respondents (3.6%), stage I hypertension as many as 41 respondents (73.2%), while those with stage II hypertension as many as 13 respondents (23.2%). 43 Almost similar results were obtained by Windarsih et al. (2017) which showed that 16 respondents (22.5%) had mild hypertension, 25 respondents (49.3%) with moderate hypertension, and 20 respondents (28.2%) with severe hypertension (Windarsih & Devianto, 2017).

The majority of respondents (71.11%) had a history of hypertension for 1-5 years, while (28.89%) had hypertension for more than 5 years and as many as 84.44% of respondents had a family history of hypertension, which is an additional risk factor. This shows that many respondents have lived with hypertension for a long time, which can increase the risk of long-term health complications, such as heart disease and stroke. A longer history of hypertension also indicates the need for more aggressive interventions to manage this condition. As many as 84.44% of respondents had a history of hypertension in the family, which is an additional risk factor. Genetics plays an important role in a person's predisposition to hypertension. Referring to the research of Mahmudah et al. (2017) genetic predisposition is a significant determinant in the etiology of hypertension. The analysis shows that the presence of a history of hypertension in both parents results in a substantial increase in risk for their offspring, with the most dominant manifestation in cases of primary (essential) hypertension. The molecular basis of this phenomenon lies in the intergenerational transmission of genetic factors that affect blood pressure regulation mechanisms. Family history can influence diet and lifestyle, and increase individuals' awareness of their health risks. Therefore, it is important to consider these genetic factors in the development of hypertension prevention and management programs.

Hypertension is defined as a medical condition characterized by elevation of blood pressure beyond normal parameters. As a chronic condition that requires continuous monitoring throughout life, hypertension has a number of non-modifiable risk factors that have been identified by Brunner & Suddarth. These factors include demographic characteristics such as race, age, genetic predisposition in family history, and gender. Pulse pressure changes in line with blood pressure fluctuations, which are influenced by the aging process and the development of atherosclerosis. In atherosclerosis, there is a degradation of vascular elasticity which leads to an increase in pulse pressure (Rinarmi & Khatijah, 2024). The circulatory system depends on adequate blood pressure to facilitate constant blood flow through the arteries, arterioles, capillaries, and venous system. Guyton's theory emphasizes that blood pressure shows a pattern of change throughout the life span, where pressure tends to be low in adolescence and begins to increase in early adulthood. The increase in blood pressure becomes more significant during the growth and physical maturation phase from late adulthood to old age, which is associated with disorders of the circulatory system in the form of blood vessel stenosis, thickening and hardening of the vascular walls, and decreased elasticity of blood vessels. The high prevalence of grade 2 hypertension in the elderly population at RSUD Chasbullah Abdulmadjid Bekasi City can be attributed to the complex interaction between non-modifiable factors such as age, gender, education level, and genetic predisposition in family history. Analysis showed that the severity of hypertension was closely correlated with suboptimal dietary patterns, characterized by high sodium and fat

intake and lack of potassium. The underlying pathophysiological mechanisms include fluid retention and plasma volume expansion due to excess sodium consumption, as well as atherosclerotic plaque formation triggered by uncontrolled saturated fat intake.

Relationship between Diet and Hypertension Levels in the Elderly

Bivariate analysis produced significant findings regarding the correlation between diet and hypertension levels in the elderly population, with a p-value of 0.035. The distribution of hypertension levels showed different patterns based on the quality of the respondents' diet. In the group with a good diet, the majority of 14 respondents were diagnosed with stage I hypertension, while only 4 respondents experienced stage II hypertension. The opposite pattern was seen in the group with a poor diet, where 15 respondents experienced stage II hypertension and 12 respondents with stage I hypertension. The results of this study were validated by several previous studies. Research by Hamzah et al. (2021) in the Molibagu Health Center working area, South Bolaang Mongondow Regency identified a significant relationship between diet and hypertension levels ($p=0.014<0.05$), which emphasizes the importance of blood pressure control and diet management in the elderly population, especially in limiting sodium and fat intake. Similar findings were also reported in the study by Pratiwi and Wibisana which showed a significant correlation between diet and hypertension levels ($p=0.000$). The study revealed the prevalence of inadequate diet in the elderly population in Blokseger Hamlet, characterized by excessive consumption of salty foods that contribute to increased blood pressure.

Statistical analysis revealed a significant relationship between diet and hypertension levels in the elderly population, as indicated by a p-value of 0.035. This relationship was manifested in different distributions between stages I and II hypertension levels based on the quality of respondents' diets. In the group with a good diet, the majority of respondents (77.8%) were diagnosed with stage I hypertension, while only a small proportion (22.22%) experienced stage II hypertension. The consumption pattern in this group was characterized by a balanced nutritional intake with adequate sodium and saturated fat restrictions. The distribution that was skewed towards stage I hypertension in this group indicated the potential protective effect of a good diet on the progression of hypertension. This suggests that although a good diet does not completely eliminate the risk of hypertension, a healthy diet can help manage and reduce the severity of hypertension. This emphasizes the importance of a good diet as part of a strategy for the prevention and management of hypertension. In contrast, respondents with poor diets were more likely to experience stage II hypertension (78.9%) compared to stage I hypertension (44.44%). Respondents with poor diets, characterized by high sodium and fat consumption and low potassium, showed a greater tendency to experience stage II hypertension. This suggests that poor diets contribute to increased risk and severity of hypertension (Hakiki et al., 2023). The high proportion of respondents with poor diets who experienced stage II hypertension suggests that interventions to improve diet are essential. Foods high in sodium and fat can worsen hypertension, so changing diets to be healthier can help reduce the risk and better manage hypertension.

The main mechanism of hypertension related to diet involves fluid and electrolyte balance in the body. Excess sodium from processed foods, salt, or fast foods causes fluid retention in the body. This increases blood volume and pressure on the walls of blood vessels, which ultimately increases blood pressure. Conversely, potassium plays an important role in counteracting the effects of sodium. Potassium helps relax vascular smooth muscle, reduces vascular resistance, and increases sodium excretion through urine.In addition, saturated and trans fats can also affect hypertension through the mechanism of atherosclerosis. Excess fat consumption can increase LDL cholesterol levels, which causes plaque buildup on blood vessel walls. This buildup narrows the lumen of blood vessels, increases resistance to blood

flow, and causes blood pressure to rise. A diet rich in saturated fats, such as fried and processed foods, is especially risky in the long term. Potassium plays an important role in blood pressure regulation through vascular homeostasis mechanisms. There is an inverse relationship between potassium intake and blood pressure, where potassium deficiency contributes to increased blood pressure, while adequate potassium intake facilitates decreased blood pressure. The antihypertensive effect of potassium is mediated through decreased vascular resistance resulting from vasodilation of blood vessels and increased excretion of water and sodium. This mechanism is closely related to the activity of the sodium-potassium pump. The recommended daily intake of potassium is 4.7 grams, which can be met through regular consumption of fruits and vegetables rich in this mineral (Octarini et al., 2023). Potassium deficiency can exacerbate the negative effects of excess sodium, thereby increasing the risk of hypertension (Kartika et al., 2016).

Analysis of the significant relationship between diet and hypertension levels in the elderly population at RSUD Chasbullah Abdulmadjid, Bekasi City leads to several important implications. Inadequate diet in the elderly group is characterized by excessive consumption of high-sodium foods, including processed foods, excess salt, and fast food. The impact of diet on hypertension is the result of the accumulation of long-term unbalanced consumption habits. This nutritional imbalance, especially in the form of sodium and fat intake that exceeds physiological needs, contributes significantly to persistent increases in blood pressure (Mahmudah et al., 2015).

CONCLUSION

This study shows that there is a significant relationship between diet and hypertension levels in the elderly in Bekasi City. Elderly with good diet tend to experience stage I hypertension, while poor diet correlates with stage II hypertension. These results indicate that diet plays an important role in the severity of hypertension in the elderly.

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