The Correlation of Food Consumption with the Prevalence of Hypertension on Midlife Adults and Elderly in Hospital of Dr. H. Soewondo, Kendal District Indonesia

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Abstract

BACKGROUND: The number of hypertension cases in Kendal District is increasing, especially in the elderly people from 60 to 74 year old. There are many factors that may cause hypertension; one of them is food consumption.

AIM: The objective of this study is to determine whether there is a correlation between food consumption and the prevalence of hypertension in the elderly in Kendal District.

METHODS: This study used a cross-sectional approach that has been carried out on 47 elderly people. The sampling technique of this study used purposive sampling. This study involved 47 elderly people as the respondents. The research data were collected by using a food consumption table questionnaire or FFQ, stethoscope, and sphygmomanometer. The research data were analyzed using Fisher Exact Test.

RESULTS: The result of the study showed that the correlation between the consumption of salty foods and the prevalence of hypertension was p = 0.000, while for the consumption of fatty foods was p = 0.464 and for the consumption of sweet foods was p = 0.728. It is concluded that there is no correlation between the consumption of fatty foods and sweet foods with the prevalence of hypertension.

CONCLUSION: There is a correlation between the consumption of salty foods with the prevalence of hypertension on midlife adults and elderly in Hospital of Dr. H. Soewondo Kendal District.

Introduction

Hypertension is a condition where the blood pressure in the blood vessels is chronically elevated. This can happen because the heart works harder to pump the blood to meet the requirement of nutrients and oxygen in the body. If it is left unchecked, this disease may interfere with the function of other organs, especially vital organs such as the kidneys and heart [73]. The data from the World Health Organization worldwide show that 972 million people or 26.4% of the world population experiences hypertension, in which 333 million people live in developed countries and the other 639 million people are in developing countries, including Indonesia [2]. The prevalence of hypertension also ranks 2 of the 10 most common diseases in outpatients in hospitals in Indonesia in 2006 with a prevalence rate of 4.67%. In 2013, the prevalence of hypertension increased rapidly by 9.5%. Based on the diagnosis made by the health workers and drug consumption, the highest prevalence of hypertension occurred in Central Java by 11.4% [26].

The data show that almost 90% of patients have unknown hypertension. Experts also reveal that there are two factors that increase the chance for someone to get hypertension, including some factors that can be controlled and some factors that cannot be controlled. Some of the controllable risk factors are lifestyle behaviors such as food consumption, stress, and lack of physical activity. Meanwhile, the uncontrollable factors include race, gender, age, and genetics [57]. The consumption of some types of foods may trigger someone to develop hypertension, such as fatty foods, sweet foods, and salty foods. From the results of modern researches, it is said that the prevalence of degenerative diseases are highly likely with aging. Although heredity does not play a large enough role, it may occur due to some changes including the pattern of food consumption and lifestyle. However, malnutrition experienced for a long time in the elderly may lead to muscle weakness and fatigue due to decreasing energy [67].

There are several factors that may cause hypertension, including some factors that cannot be changed, such as heredity, sex, and age, and some factors that can still be changed including the habit of consuming alcoholic beverages, excessive consumption of salt or sodium, nutritional status, consumption of fat, and physical activity [43]. Bad habits related to food consumption may cause a more

severe hypertension in various body organs such as damage to the eyes, heart, and brain [53]. Based on the overview of the background earlier, the researchers are interested in conducting study on the correlation between food consumption and the prevalence of hypertension on midlife adults and elderly in Hospital of Dr. H. Soewondo Kendal District.

Methods

The design of this study used analytical observation with the objective to figure out of the food consumption associated with the prevalence of hypertension on midlife adults and elderly in Hospital of Dr. H. Soewondo Kendal District. This type of research design uses cross sectional. This study was conducted in July 2020. The instruments used in this study are a food consumption table questionnaire, sphygmomanometer, and stethoscope. The population of this research is all of midlife adults and elderly people in Hospital of Dr. H. Soewondo Kendal District collected using purposive sampling technique with a total sample of 47 respondents. The research data were analyzed univariately using frequency distribution and bivariate analysis using Chi-square test.

Results

The majority of respondents were women aged 60-74 years, had hypertension, mild hypertension levels, consumption of salty food more, consumption of fatty food more, consumption of sweet food less. Results can be seen in Tables 1 and 2.

Discussion

The characteristics of the respondents based on sex

The results of this study show that the majority of midlife adults and elderly are female with 27 respondents (57.4%). The results of this study are in line with the research by Manik and Wulandari [34] which shows that from the characteristics of respondents based on gender, the majority of respondents experiencing hypertension are female with 32 respondents (80%) and male with eight respondents (20%). Another study by Dalmazo *et al*. [46] shows that there is a correlation between stress and food consumption in people who suffer from hypertension, in which the majority of respondents are female (67%). Women will experience an increased risk of high blood pressure after menopause, namely those who are over 45 year old [39].

The sex group who is at risk of experiencing hypertension according to Nuraeni's research [51] is female older than 45-years-old from a total of 117 respondents (55.7%), while the sex group that has a small risk of experiencing hypertension is male older than 45 years old and women younger than 45 years old are 93 respondents (44.3%). Women who enter the premenopausal period will be more likely to experience an increase of blood pressure caused by the loss of the estrogen hormone which protects blood vessels from damage [67]. The reduced estrogen hormone in postmenopausal women may cause constriction of blood vessels which will later increase blood pressure [60].

The characteristics of the respondents based on age

This study found that most of the age groups of the respondents with 26 respondents (55.3%) are between 60 and 74 years old, 14 respondents (29.8%) are between 45 and 59 years old, and 7 respondents (14.9%) are between 75 and 90 years The results of the study are in line with the research of Hamzah *et al*. [38] in their study, it is shown that from majority of people from 60 to 74 years old age group with 26 respondents (83.9%) and minority of people from 75 to 90 years old age group with five respondents (16.1%), in which the older the elderly people, they are more vulnerable to disease like hypertension, which is due to the habit of elderly people to consume sodium. The results of the study by Nakamura *et al*. [47] are related to the correlation between the intake of saturated fatty acids (SFA) and prevalence of hypertension, which shows that the majority of people affected by hypertension were 585 Japanese respondents form 40 years old and older.

The majority of women between 60 and 79 years which is 48.8% while approximately 63% of 80-years-old women are found to have cases of Stage 2 hypertension, with their majority of blood pressure values are 160/100 mmHg [48]. From the research by Ferri *et al*. [49] conducted over 2,636 patients with hypertension, the majority of the respondents are 75 years old, while the majority of respondents live in nursing homes are 80 years old. Along with the aging elderly, the prevalence of hypertension may also increase. Most studies also show that someone will experience hypertension when they are 50 years old and older [68].

The characteristics of the respondents based on hereditary hypertension

The results of this study show that the majority

of the elderly respondents who do not have a history of hereditary hypertension are 29 respondents (61.8%) and there are 18 respondents (38.2%). The results of this study are in line with the research of Dismiatoni *et al.* [40] which shows that out of the 29 respondents, the majority has no hereditary hypertension with17 respondents (58.6%). An increasing number of family members with hypertension or blood pressure in a group where family members of the patients with hypertension can be treated with primary prevention efforts related to hypertension [50]. Another study that is not in line with the research of Nugroho *et al.* [59] shows that the results of the study show a correlation between the history of hypertension and the prevalence of hypertension in the elderly in the working area of the Public Health Center in Sidorejo Lor. Other studies also show that someone who has a history of hypertension will be more likely to experience hypertension than those who do not [62].

Based on several studies, it was found that hypertension may also be caused by other things than heredity, which are an unbalanced pattern of food consumption and an unhealthy lifestyle. It has been proven that not only blood pressure but also the regulatory mechanism of the renin-angiotensin-aldosterone system, the sympathetic nervous system, and everything may be influenced by genetics where modern biomolecular techniques have enabled the examination of the responsible genes for the prevalence of hypertension [41]. According to the theory, if someone has a family history of being a hypertension carrier, they will be twice likely to develop hypertension where the symmetric gene will code for the aldosterone synthase gene so that it will result in ectopic aldosterone production, in which the increase of aldosterone will cause an increase of water retention and will cause an increase of blood pressure [51].

The characteristics of the respondents based on hypertension level

Based on Table 1, the majority of the respondents are at the level of mild hypertension with 21 respondents (44.7%). The results of this study are in line with the research by Manik and Wulandari [34] which says that the majority of the 40 respondents prolanis 17 respondents (42.5%) experience mild hypertension, 13 respondents (32.5%) have severe hypertension, while the five respondents experience moderate and high levels of hypertension. Another study compared to the research of Cheristina and Ramli [42] indicates that the majority of respondents have moderate hypertension with 32 respondents (42.7%), 24 respondents (32.0%) have mild hypertension, and 19 respondents (25.3%) have severe hypertension.

The level of mild hypertension is also mentioned by the result of the study of Mariani and Susilawati [69] indicating that from the categorical

variable at the level of hypertension, it is found that the majority of respondents have mild hypertension with 28 respondents (41.1%) while 40 respondents (58.8 %) have severe hypertension. The research on the level of hypertension in the elderly people may be influenced by blood vessels disorder such as stiffness and impaired elasticity so that the response of the blood vessels is reduced [57].

Table 1: Characteristic of responden (n = 47)

Characteristic	f	%
Sex		
Female	27	57.4
Male	20	42.6
Age		
45–59 years	14	29.8
60–74 years	26	55.3
75–90 years	7	14.9
History of hypertension		
No hypertension	29	61.8
Hypertension	18	38.2
Level of hypertension		
Normal	10	21.3
Mild	21	44.7
Moderate	14	29.8
Severe	2	4.2
Consumption of salty food		
More	31	66.0
Less	16	34.0
Consumption of fatty food		
More	25	74.5
Less	12	25.5
Consumption of sweet food		
More	15	31.9
Less	32	68.1

The characteristics of the respondents based on the consumption of salty food

This study found that the majority of respondents excessively consume salty food with 31 respondents (66.0%). A similar study by Herawati *et al.* [43] states that the results of salt intake are obtained by the most people who consume excessive amounts of salty food with 41 respondents (78.8%) and sufficient intake of salty food with 11 respondents (21.2%). Another study Blood Pressure UK (2008) shows that excessive consumption of sodium or salt compared to the normal daily limit may cause someone to suffer from the damage of their brain, heart, arteries, and kidneys.

The multivariate analysis conducted by Sudiasih *et al.* [58] shows that out of 203 respondents, 14.8% have hypertension. This result shows that there is a relationship of the prevalence of hypertension with salt intake that is 1500 mg/day. Research by Choi *et al.* [55] indicates that a high salt diet is associated with the development of hypertension, which is one of the most significant risk factors of cardiovascular. Another study that says the same is conducted by Leyvraz

Table 2: Analysis of correlation of food consumption with hypertension (n = 47)

Food consumption	f	%	f	%	f	%	Value
More	30	63.8	1	2.1	31	65.9	0.000
Less salty	4	8.5	12	25.6	16	34.1	
More	24	51.1	11	23.4	35	74.5	0.464
Less fatty	10	21.3	2	4.2	12	25.5	
More	10	21.3	5	10.7	15	31.9	0.728
Less sweet	24	51.1	8	17.0	32	68.1	

et al. [56], showing that the majority of respondents add salty spices and salt during cooking as much as 92%. A higher salt intake is a main risk factor of hypertension and cardiovascular disease. Women at the age of menopause will experience hormonal changes which will later lead to an increase of body weight and blood pressure, which may cause them to be more reactive to salt consumption so that it will later lead to hypertension [61].

The characteristics of the respondents based on the consumption of fatty food

The results of this study show that the majority of respondents excessively consume fatty foods with 35 respondents (74.5%). Research by Herwati *et al*. [43] shows that the majority of respondents excessively consume fat intake with 45 respondents (86.5%) and the other seven respondents (13.5%) have sufficient intake of fat. Other researchers Nugroho *et al*. [59] says that the characteristics of research respondents based on the type of food consumed, as many as 25 respondents (62.5%) consume fatty foods while the majority consume fried snacks with 31 respondents (77.5%). The excessive consumption of fat tends to increase the amount of cholesterol in blood, so that is suggested to limit fat intake.

Another study by Nurarima [63] says that on the respondents who often consume fat, the prevalence of hypertension will occur more often than the respondents who never or rarely do. The research says that if the level of fat in blood is high, it may cause a blockage in the area of the blood vessels so that it will be able to cause disturbances in the cardiovascular system [70]. Fat may cause cardiovascular disease, but does not directly trigger the prevalence of hypertension.

The characteristics of the respondents based on the consumption of sweet food

This study found that the majority of respondents consume less sweet foods with 32 respondents (68.1%). The research is in line with the research conducted by Herawati *et al*. [43] which states that the majority of respondents consume less sugar intake with 37 respondents (72.2%) and 15 respondents (28.8%). Sweet food that contains addictive substances may cause someone to not feel satisfied and will eat continuously. It will eventually result in obesity that may later lead to insulin resistance [57]. Sweet foods do not cause an increase of blood pressure, but if it is consumed excessively it may trigger other health problems that can be detrimental.

The study by Rabaity [44] is not in line with this study, which states that sugar intake is related to the prevalence of hypertension. Besides, there is also a simple relationship between sugar intake and hypertension. The research conducted in Mexico said that by reducing the intake of drinks or foods containing sugar every day, it may reduce the diastolic blood pressure by 1.1 mmHg and systolic blood pressure by 1.8 mmHg within 18 months [66].

The correlation between food consumption and the prevalence of hypertension in the elderly in Hospital of Dr. H. Soewondo Kendal District

The results of the Chi-square test that has been conducted within this study obtains a significance level of 95% ($\alpha < 0.05$) showing a p = 0.000. This p value is smaller than α, which means H0 is accepted. It shows that there is a correlation between the consumption of salty foods with the prevalence of hypertension in the elderly in Hospital Dr. H. Soewondo in Kendal District. Based on the results of the study, it is concluded that the consumption of foods that are high in sodium may affect the increase of blood pressure. Judging from the results of the study, 30 respondents who consume salty foods will be more likely to experience hypertension and there is only 1 respondent who does not suffer from hypertension. The result of the study conducted by Manik and Wulandari [34] shows that food flavoring has a significant correlation with diastolic blood pressure p value of 0.004 with a close correlation of 0.442 (moderate correlation) and systolic blood pressure p value of 0.017 with a close correlation of 0.535 (medium correlation). This study finds that the respondents often consume foods containing salt (NaCl) and mono sodium glutamate (MSG). Another study by Harmilah *et al*. [36] indicates that based on the habit of consuming table salt, it is shown that from 58 respondents who consumed table salt excessively, 37 respondents (50.0%) and 37 respondents (71.6%) suffer from hypertension.

Another similar study finds that excessive sodium intake is associated with the prevalence of hypertension with a result of p = 0.001. According to the research by Suharto [71], some factors that may affect changes in blood pressure are blood control and regular medication. The results of this study are in line with the results of WHO research [2] which say that someone who consumes salt excessively may show a direct effect in the increase of their blood pressure. According to Blood Pressure UK (2008), when the increase of blood pressure is caused by consuming too much sodium or salt continuously, it may result in fatal condition of the arteries. Some experts finds that dietary factors is one of the contributors to hypertension and that foods containing table salt and high amounts of flavoring may increase blood pressure since they contain excessive amounts of sodium [36].

The results of the analysis on the consumption of fatty foods (p = 0.464) and sweet foods (p = 0.728) shows that there is no significant correlation with the prevalence of hypertension suffered by the elderly people since p > α. According to Blood Pressure UK

(2008), the consumption of fatty foods may increase body weight and cholesterol. Increased body weight and cholesterol will later trigger sudden strokes and heart attacks. The results of this study indicate that the consumption of fatty foods is not a risk factor for hypertension. The research is not in line with the research of Wijaya *et al.* [37] which shows that the Chi-square test results show that the p = 0.000, which means that there is a correlation between the habit of fatty foods consumption and the prevalence of hypertension.

The correlation between fat intake and hypertension is shown in study conducted by Nugroho *et al.* [59], in which 62.5% of respondents consume fatty foods and 77.5% of respondents consume snacks in form of fried foods. The high levels of fat in blood may cause fat to stick to the area of the walls of the blood vessels, so it may later cause blockage of blood vessels and result in the heart to pump blood in an increasingly stronger manner and will trigger an increase in blood pressure [64].

A similar study by Adriaansz *et al.*, [65] indicates that there is no correlation between the consumption of sweet foods and the prevalence of hypertension. The research is not in line with the research conducted by Rabaity [44] which says that there is a correlation between sugar consumption and the prevalence of hypertension. The excessive consumption of sugar should be limited to 5% of the amount of energy adequacy as it is feared to lead to obesity [43]. The American Diabetes Association [72] says that excessive consumption of sweet foods may not only increase body weight but may also increase other risk factors such as suffering from type 2 diabetes. The results of this study showed that there is no real correlation between the habit of consuming sweet foods and the prevalence of hypertension.

The consumption of UPH or an industrial formulation of chemical compounds outside the cooking ingredients commonly used such as fat, oil, sugar, and salt, including those naturally contained within the food but are not used in culinary preparations shown in the study conducted by Mendonca *et al.* [45] shows that among the 1702 incidents of hypertension cases identified, the majority of the respondents consume fat, oil, sugar, and salt which results in a higher risk of developing hypertension. The correlation between saturated fat intake (SFA) and hypertension found in the study by Nakamura *et al.* [47] indicates that the prevalence of hypertension is 54.2%, in which the saturated fat intake is lower on the research subjects suffering from hypertension, while the correlation is significantly stronger among the elderly respondents.

The elderly people who are the respondents of some studies mostly consume foods that may cause hypertension, including foods containing fat, sugar, and salt [52]. The data analysis conducted by Mariani and Susilawati [69] by using the Chi-square test obtains the result of hypertension research on low salt diet (p = 0.013). In this case, there is a theory saying that the recommended consumption of table salt containing iodine should not be more than 6 g/day, which is equivalent to one teaspoon. However in reality, such excessive consumption is likely to be caused by the cooking culture of Indonesian people in general who tend to use MSG and salt abundantly [54].

Conclusions

From the results of the study that has been conducted, it can be concluded that the majority of the respondents are within the age range of 60–74 years old with the majority of them are female with no hereditary history of hypertension. Meanwhile, it is also shown that the most consumed food by those elderly people is sodium or salt and. The results of the exact text found that there was a significant correlation between the consumption of salty food and the prevalence of hypertension in the elderly in Hospital of Dr. H. Soewondo in Kendal District.

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