CORRELATION BETWEEN NUTRITIONAL STATUS AND WAIST CIRCUMFERENCE WITH THE INCIDENCE OF HYPERTENSION IN THE ELDERLY

Hubungan Status Gizi dan Lingkar Perut dengan Kejadian Hipertensi Pada Usia Lanjut

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ABSTRACT

Background : Hypertension is the main risk factors of cardiovascular diseases that cause mortality. One of the risk factors of hypertension is obesity. **Purpose:** This study aimed to determine the relationship between nutritional status and waist circumference with the incidence of hypertension in the elderly. **Methods:** This study was observational analytic with cross-sectional design. The sample in this study was a partial of the elderly who participated in the elderly posyandu as many as 271 respondents. The sampling techniques is simple random sampling. Secondary data in the form of the results of the elderly health checkup at the elderly posyandu in the Sidotopo Wetan Public Health Center (Puskesmas Sidotopo Wetan) in 2018. **Results:** This study showed that of 271 respondents, there were 107 respondents found with hypertension (39.50%). The majority of hypertension was suffered by respondents with overweight nutritional status (46.70%), and waist circumference with the central obesity category (74.80%). Correlation found between nutritional status and the incidence of hypertension in the elderly (p=0.02<α=0.05; PR=1.32). Prevalence Ratio of 1.32 means that elderly people with overweight nutritional status have the risk of 1.32 times greater to experience hypertension than elderly with underweight and normal nutritional status. No correlation found between waist circumference and the incidence of hypertension (p=0.21). **Conclusion:** Nutritional status significantly associated with the incidence of hypertension in the elderly. However, waist circumference is not significantly associated with the incidence of hypertension.

ABSTRAK

Latar Belakang: *Hipertensi atau tensi darah tinggi merupakan faktor risiko utama penyakit kardiovaskular yang berisiko menyebabkan kematian. Faktor risiko hipertensi salah satunya adalah obesitas.* ***Tujuan:*** *Penelitian ini bertujuan untuk melihat hubungan status gizi dan lingkar perut terhadap kejadian hipertensi pada lansia.* ***Metode:*** *Jenis penelitian ini adalah analitik observasional dengan*

menggunakan pendekatan cross sectional. Sampel yang digunakan dalam penelitian ini adalah sebagian lansia yang ikut posyandu lansia yaitu sebanyak 271 responden. Teknik pengambilan sampel menggunakan simple random sampling. Penelitian ini menggunakan data sekunder berupa hasil pemeriksaan kesehatan lansia di posyandu lansia wilayah kerja Pusat Kesehatan Masyarakat (Puskesmas) Sidotopo Wetan tahun 2018. **Hasil:** *Penelitian ini menunjukkan bahwa dari 271 responden terdapat 107 responden mengalami hipertensi (39,50%). Mayoritas hipertensi diderita responden dengan status gizi lebih (46,70%), dan lingkar perut dengan kategori obesitas sentral (74,80%). Ada hubungan antara status gizi dengan kejadian penyakit hipertensi pada lansia (p=0.02<α=0.05; PR=1.32). Lansia dengan status gizi lebih memiliki risiko 1,32 kali lebih besar mengalami hipertensi dibandingkan dengan lansia yang berstatus gizi kurang dan normal. Tidak ada hubungan antara lingkar perut dengan kejadian penyakit hipertensi (p = 0,21).* **Kesimpulan:** *Status gizi berhubungan signifikan dengan kejadian hipertensi pada lansia dan lingkar perut tidak berhubungan secara signifikan terhadap kejadian hipertensi.*

INTRODUCTION

A great and sucessful health development is indicated by the increase of Life Expectancy (LE) and standard of living. An increase in LE is characterized by changing demographic structure due to the occurrence of an elderly population which increased along with the decrease in morbidity and mortality (Ministry of Health RI, 2013a).

The results of the population census in 2010 indicated that Indonesia is a country that has an old structure. The elderly are people who are 60 years old or older. The increasing number of elderly people in Indonesia demands a special attention to the elderly, due to the aging process as their physiological, thinking, emotional, sexual, and social changes (Agustina, Sari, & Savita, 2014). The declining condition in the health of the elderly is caused by natural processes or due to diseases. One of the non-communicable diseases that is often experienced by the elderly is hypertension (Ministry of Health RI, 2013b).

Cardiovascular disease is found to be the cause of 17.50 million deaths every year in the world with cases of hypertension contributing around 9.40 million of deaths (WHO, 2014). Cardiovascular disease can be the leading cause of mortality in the world for people aged 65 years and over. The WHO has estimated that there are 9.40 million deaths in the world or 45% of the total deaths which caused by hypertension. Efforts to reduce the rate of mortality and morbidity due to cardiovascular disease can be done in a preventive and rehabilitative way (WHO, 2013).

The prevalence value of hypertension in Indonesia which obtained from the measurement results is 25.80%. This value has decreased from 2007 by 31.70% (Ministry of Health RI, 2013b). Changes in the prevalence value of hypertension occur as a result of the aging process and life style changes such as alcohol consumption, unhealthy diet, excessive weight, lack of physical activity or exercise, smoking, and stress (Harahap, Rochadi, & Sarumpaet, 2017). The study conducted by Asrinawaty & Norfai (2014) in the Integrated Health Service Post for Elderly (Posyandu Lansia) Kakaktua at Pelambuan Public Health Center (Puskesmas Pelambuan) showed a significant result between nutritional status and hypertension in the elderly people there. People with abnormal nutritional status has the tendency to experience very high degenerative diseases. This is in line with the research of Agustina, Sari, & Savita (2014) which showing that several factors that have a significant impact with hypertension namely, gender, obesity, cigarette habits, stress, heredity, and physical activity. The factors which have a significant impact in the study is heredity.

While the research conducted by Kautsar, Syam, & Salam (2014) showed that respondents who had excessive body mass index more likely to

experience high blood pressure (44.90%). This is an evidence that hypertensive patients may have a strong connection to nutritional status. The body mass index can be used to determine a person's nutritional status by calculating the weight (kilograms) divided by the height (meters) squared. If the BMI value is ≥ 27.00, it can be said that the person is obese (Ministry of Health RI, 2013b).

Along with aging, the physiological function of human will decline, causing a decrease in health condition, one of which is an increase in blood pressure. This condition is caused by a decrease in the flexibility of blood vessels, where the walls of blood vessels become stiff and create a larger burden on the work of the heart to cause an increase in blood pressure (Sihombing, 2017). High blood pressure is found in patients with high BMI than patients with low and normal BMI (Varshitha, 2015). This study was conducted to analyze the relationship between nutritional status and waist circumference with the incidence of hypertension of the elderly.

METHOD

This study is an observational analytic study with a cross sectional approach. The study was conducted at the elderly posyandu Puskesmas Sidotopo Wetan work area in March 2019. The population in this study is all of the elderly people who participated in the inspection activities at the elderly posyandu in the Puskesmas Sidotopo Wetan working area which consisted of 515 participant. Samples were taken from several of the elderly who took part in the study, namely 271 people. The sampling is conducted with simple random sampling technique and a random number table. The type of data used is secondary data which obtained from the results of the annual elderly health examination at the elderly posyandu in the Puskesmas Sidotopo Wetan working area in 2018. The study used inclusion criteria in the form of complete data on the health history of the elderly posyandu in the Puskesmas Sidotopo Wetan.

Spygmomanometer needles were used to measure the blood pressure which taken only one time. Measurements were made on the respondent's right hand in a sitting position and had rested for at least 5 minutes. Body mass index obtained based on measurements of height and weight. Height was measured using microtoise with accuracy of 0.10 cm applied on the respondents in a standing position. The body weight was measured using needle weight scales with accuracy of 0.10 kg. The waist circumference was measured using cloth metlin on the respondent in a standing position. These measurements were made by the health workers at Puskesmas Sidotopo Wetan.

The independent variables studied are the nutritional status and waist circumference, the dependent variable studied is the incidence of hypertension. Hypertension is categorized into non-hypertensive and hypertensive status. The status of hypertension according to JNC VII is grouped into hypertension if the systolic blood pressure exceeds 140 mmHg and diastolic blood pressure exceeds 90 mmHg, and negative when the systolic blood pressure does not exceed 140 mmHg and the diastolic blood pressure does not exceed 90 mmHg (NHLBI, 2004). The nutritional status can be acknowledge from BMI value obtained by calculating weight (kilograms) divided by height (meters) squared. The Ministry of Health categorizes nutritional status into underweight status for BMI <18.40), normal nutritional status for BMI 18.50 - 25, and overweight nutritional status for BMI> 25.10 (Ministry of Health RI, 2013b). The ministry of health also categorizes waist circumference into central and normal obesity. Central obesity is when the male waist circumference is $\geq$ 90 cm and female waist circumference is $\geq$ 80 cm, while normal waist circumference for male is <90 cm and female <80 cm (Ministry of Health RI, 2013b).

The age group were classified into middle age (45-59 years), younger elderly (60-74 years), older elderly (75-90 years), and very old elderly (> 90 years) age groups. Gender is categorized into two, namely male and female. The level of education is categorized into low education (not attending school / elementary / junior high school level) and higher education (high school / university / academy level). Working status is categorized into two, namely working and not working/employed or unemployed.

The data were analyzed by univariate and bivariate methods. The univariate analysis is presented in the form of a frequency distribution table for each variable which includes gender, education level, age and working status. The bivariate analysis was conducted through the Chi square test. The confidence interval in the study is 95% and $\alpha = 0.05$. As for the risk calculation the Prevalence Ratio (PR) is applied.

RESULTS

Incidence of Hypertension based on the Respondents Characteristic

The majority of the elderly people in the elderly posyandu in the Puskesmas Sidotopo Wetan work area were found without hypertension, but the number of elderly with hypertension was still quite high with 107 respondents. The majority of the elderly is 148 respondents (54.60%) and 64 of them suffered from hypertension (59.80%). The number of the female elderly is higher than the male respondents, which is 203 respondents and 75 of them suffer from hypertension. The majority of the elderly people with a history of low level education were 194 respondents (71.60) and 77 of them suffered from hypertension. The distribution of the number of elderly people who did not work is more than the respondents who worked with 197 respondents (72.70%) and 69 of them suffered from hypertension (Table 1).

Incidence of Hypertension based on the Nutritional Status and Waist Circumference

The majority of th elderly with normal nutritional status were 142 respondents (52.40%) with 45 respondents among them suffering from hypertension. This number is lower than the number of hypertensive patients with higher nutritional status, with 50 respondents (46.70%). The number of central obesity of waist circumference in the elderly is higher than the normal circumference (70.50%). Hypertension also affects the elderly with the central obesity compared to the normal waist circumference (74.80%) (Table 2).

Bivariate Analysis of the Nutritional Status and Waist Circumferense with Hypertension Status

The results of bivariate analysis through the Chi-square showed that the value of $p = 0.02$ ($p < \alpha = 0.05$) which means that there was a significant relationship between nutritional status and the incidence of hypertension in the elderly posyandu in the Puskesmas Sidotopo Wetan work area (Table 2). The Prevalence Ratio (PR) obtained was 1.32 meaning that the elderly with higher nutritional status had a risk of 1.32 times more prone to suffer from hypertension compared to the elderly with normal nutrition.

The results of bivariate analysis using Chi-square showed that the value of $p = 0.21$ ($p > \alpha$; $\alpha = 0.05$) means that there is no significant relationship between waist circumference and the incidence of hypertension in the elderly posyandu.

Table 1

Hypertension Status based on Elderly Characteristics at Elderly Posyandu in the Puskesmas Sidotopo Wetan Work Area

Variable	Hypertension Status				Total	
	Hypertension		Not Hypertension			
	n	%	n	%	n	%
Age Group (year)						
Middle Age (45 – 59)	36	33.60	65	39.60	101	37.30
Younger Elderly (60 – 74)	64	59.80	84	51.20	148	54.60
Older Elderly (75 – 90)	5	4.70	15	9.10	20	7.40
Very Old Elderly (> 90)	2	1.90	0	0.00	2	0.70
Gender						
Male	32	29.90	36	22.00	68	25.10
Female	75	70.10	128	78.00	203	74.90
Education Level						
Low	77	72.00	117	71.30	194	71.60
High	30	28.00	47	28.70	77	28.40
Working Status						
Working	38	35.50	36	22.00	74	27.30
Not Working	69	64.50	128	78.00	197	72.70
Total	107	100.00	164	100.00	271	100.00

Table 2
Bivariate Analysis of Nutritional Status and Waist Circumference with Hypertension Status at Elderly Posyandu in the Puskesmas Sidotopo Wetan Work Area

Variable	Hypertension Status				Total		p	PR
	Hypertension		Not Hypertension					
	n	%	n	%	n	**%**		
Nutritional Status								
Underweight	12	11.20	9	5.50	21	7.70	0.02*	0.55
Normal	45	42.10	97	59.10	142	52.40		
Overweight	50	46.70	58	35.40	108	39.90		1.32
Waist Circumference								
Central obesity	80	74.80	111	67.70	191	70.50	0.21*	
Normal	27	25.20	53	32.30	80	29.50		
Total	107	100.00	164	100.00	271	100.00		

Chi Square test (CI = 95%)

DISCUSSION

The majority of hypertensive patients at the elderly posyandu in the Puskesmas Sidotopo Wetan work area are elderly people. This is in line with the theory explaining that the increase in the incidence of hypertension occurs along with age of a person due to the aging process, resulting in a decline in physiological function of the body (Sihombing, 2017). Research conducted by Agustina, Sari, & Savita (2014) also revealed a similar finding that the majority of the elderly (60-74 years) from the Malay tribe suffered from hypertension (83.90%). Research by Rohkuswara & Syarif (2017) also shows an increase in the incidence of hypertension along with the increase in the age of the respondents.

The results showed that the majority of hypertension suffered by elderly female. This study was supported by Julianti, Pangastuti, & Ulvie (2015) who suggested that the majority of hypertensive patients are female (67.20%). However, different results are shown by Hasanah, Widodo, & Widiani (2016) which show that the majority of hypertensive patients are male. Research conducted at the Puskesmas Pelabuhan Bandung also showed that hypertensive patients were mostly dominated by male (76.74%) (Rohkuswara & Syarif, 2017). This difference is affected by differences in the sample, where in this study is dominated by female.

The majority of hypertension is experienced by the elderly with lower level of education. This is in accordance with the results of the Indonesia Basic Health Research (Riskesdas) in 2013 which reported that the prevalence of hypertension is suffered by group with lower education. This is because ignorance in carrying out healthy life patterns results in the emergence of various diseases (Ministry of Health RI, 2013b). The results of research conducted by Sartik, Tjekyan, & Zulkarnain (2017) are not in line with this study because the majority of hypertensive patients have higher education.

The majority of hypertensive patients did not working. This is due to that the elderly are in retirement age and their physiological abilities have lowered. A research conducted by Wulandari & Lestari (2018) states that age> 60 years is a retirement period and in that age there is a decrease in body function, making it susceptible to various diseases. The risk of cardiovascular disease increases to 2 times higher in retirement age. While research carried out by Sartik, Tjekyan, & Zulkarnain (2017) showed different results that the incidence of hypertension was higher in working respondents (83.90%) compared to those who did not work with only 16.10%.

The majority of the elderly posyandu in the Working Area of the Puskesmas Sidotopo Wetan with hypertension have higher nutritional status (BMI> 25.10). The elderly people 1.32 times more like to suffer from hypertension are compared with people with lower and normal nutritional status. Several studies have shown that an increase in a person's BMI may cause an increased risk of hypertension, and vice versa. This is due to changes in the amount of total blood volume and hormones associated with blood pressure along with changes in body weight (Sartik, Tjekyan, & Zulkarnain, 2017). This study is also in line with one study conducted by Rahadiyanti, Setianto, & Purba (2015) that the prevalence of hypertension is dominated by higher nutritional status. The risk of suffering from hypertension is 3.16 times higher in higher nutritional status when compared to the normal nutritional status. Similar results are also shown by Agustina & Raharjo (2015) research that

there is a correlation between overweight and hypertension in productive age. In the study it was also concluded that respondents with overweight had a risk of 3.50 times more likely to suffer from hypertension compared to respondents with normal nutritional status or underweight. Other studies also show results that are in line where a significant correlation found between obesity with hypertension. Obesity increases the workload of the heart and decreases the flexibility of blood vessels, thereby increasing blood pressure (Metasari & Lasmadasari, 2017). Obesity can increase the risk of hypertension due to several reasons. The greater the BMI, the more blood required. Some studies have shown that excessive body weight is a characteristic of people with cases of hypertension. This is because the cardiac output and cyclic blood volume in patients with obesity and hypertension are higher when compared with respondents with normal nutritional status or blood pressure. Nutritional status correlates very significantly with blood pressure, especially for the systolic blood pressure. Hypertension in people with higher nutritional status has 5 times higher risk when compared to someone with ideal or normal nutritional status (Wahyuddin & Andajani, 2016).

The results showed that the majority of hypertensive patients in the elderly posyandu in the Puskesmas Sidotopo Wetan work area were found to have central obesity. Central obesity that occurs in the elderly is caused by lack of physical activity and the hormonal changes which cause a buildup of fat in the body. When a person enters older age of their life, their body composition changes as they age (Sofa, 2018). The research conducted by Haryuti, Saraswati, Udiyono, & Adi (2017) also showed similar results where almost all respondents suffered from central obesity (87.80%).

This study showed no correlation between central obesity and hypertension found in the elderly posyandu in the Puskesmas Sidotopo Wetan work area. This study is in line with research conducted by Kautsar, Syam, & Salam (2014) which showed that waist circumference was not related to blood pressure (p = 0.72).

This study has different result from the Arlappa et al (2014) study which showed that the elderly with central obese were at risk of suffering from hypertension 1.50 times compared to elederly with normal waist circumference. A study by Yuriah, Astuti, & Inayah (2019) shows that there is a significant correlation between the waist hip ratio and the incidence of hypertension. Excessive hip waist circumference ratio is caused by accumulation of fat in the abdominal cavity. Fat accumulation is caused by excessive food consumption which unbalanced with physical activity. Continuous fat buildups can lead to clogged blood vessels and the heart will work harder in pumping the blood, therefore blood pressure increases. Syarifudin & Nurmala (2015) study in Purworejo, Central Java showed that waist circumference had a significant relationship with hypertension. The results suggested that respondents in the obesity category based on waist circumference had a risk of 2.31 times greater suffering from hypertension than respondents with normal waist circumference.

More epidemiological studies have suggested that increased blood pressure occurs along with increase in body weight. Obese people will be more likely to suffer hypertension. Non-pharmacological therapy for weight loss is done by physical activity or exercise, reducing consumption of foods that high in carbohydrate and sodium, avoiding alcohol consumption, reducing smoking habits, and stress management (Sudarsono, Sasmita, Handyasto, Arissaputra, & Kuswantiningsih, 2017).

Research Limitation

This study has limitation as the results of the health measurements carried out only in one visit, thus the results may change. Another limitation is that the risk factors studied are only obesity variables which are calculated from nutritional status and waist circumference, therefore it may cause bias.

CONCLUSION

Nutritional status has a significant correlation to the hypertension at the elderly posyandu in the Puskesmas Sidotopo Wetan work area. The elderly people who have overweight nutritional status 1.32 times more likely to suffer from hypertension than ones with normal and underweight. There is no significant relationship found between waist circumference and the incidence of hypertension in the elderly.

CONFLICT OF INTEREST

The authors declare that no conflict of interest in this study.

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