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The Correlation Between Waist Circumference and Blood Pressure For People Aged 25 To 60 Years Old In Palur Village Ca III

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Abstract: The digitalization era significantly influences human life, such as lifestyle and physical activity. Human life change happens because of the ease of access provided by digitalization to purchase goods from home. This matter becomes the predictor of waist circumference and body mass index increase with obesity risks. Larger waist circumference influences the increased intra-abdominal fat accumulation. This fat accumulation leads to obesity and hypertension. This research aims to determine the correlation between waist circumference and blood pressure of people aged from 25 to 60 years old in Palur village, CA III. This cross-sectional research used chi-square data analysis. The results showed that 51 people out of 100 had a larger waist circumference than 90cm suffering from hypertension.

Keywords: Waist circumference, Blood pressure

INTRODUCTION

Overweight and obesity are defined as intra-abdominal fat accumulation. This matter can lead to health problems. Obesity is also a chronic disease risk factor that can raise hypertension, type-II diabetes Mellitus, and lipid disorder. The factor is also known as an independent risk factor for cardiovascular diseases (Singh & Kaur, 2012). The increased prevalence of cardiovascular disease becomes the primary problem encountered by advanced and developing countries. A percentage of 50% of cardiovascular diseases are caused by hypertension (Anggraini et al., 2009).

The American Heart Association (2013) found that 77.9 million adults in the United State suffered from hypertension. WHO found the prevalence of people suffering from hypertension was dominated by low-income and developing countries. Based on this information, Indonesia became the top 10 countries with most people suffering from hypertension (Anggraini et al., 2009). A study by Framingham found each 10% increased weight, the human would suffer increased systolic blood pressure of 7mmHg. The study also found each 1kg weight loss would decrease the systolic blood pressure by 0.33 mmHg and 0.43 mmHg on diastolic blood pressure. The long-term effect of weight control showed that weight loss could lower hypertension risks by a percentage of 77% (Zhang et al., 2012).

The most practicable indicator to determine fat accumulation in the body is - anthropometry. This method measures the waist circumference (Tuan et al., 2010). This research had some challenges while collecting the data due to limited respondents. The researchers also could not control the respondents so the predicting factor, the increased blood pressure, occurred in the respondents. This research aims to determine the correlation between waist circumference and blood pressure, and the possibility of waist circumference to predict hypertension.

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METHODS

This observational analytical research applied to cross-sectional approach. The sample consisted of Palur people, within the area of Citizen Association III, Ngringgo, aged from 25 to 60 years old. The researchers took the sample with a total sampling technique based on the applied inclusive criteria. The criteria were the citizen of Palur village within the area of CA III, male and female people, people aged from 25 to 60, and non-alcohol drinkers. The applied exclusive criteria were respondents with lumbar scoliosis, pregnant women, and people with blood pressure control medication. The researchers used some instruments, such as *Riester* sphygmomanometer, *ABN Majestic* stethoscope, and *Butterfly* miterline.

The researchers ensured the respondents did not promote physical activities, such as exercising, smoking, or having a meal for at least 30 minutes. The researchers asked the respondents to sit and relax for 5 until 15 minutes. Then, the researchers measured the blood pressure. In the first step, the researchers introduced and told the respondents about the researchers' identities and objectives of the blood pressure measurement. Then, the researchers had the respondents sit without crossing their legs. The researchers instructed the respondents to put their right arms on a table, The researchers instructed the respondents to inflect the position of the right arms and put the arm higher than the heart position. The researchers rolled up the sleeve of the respondents' right arms. Then, the researchers put the cuff around the upper part of the right arms. The researchers checked the pulses on the wrists. Then, they closed the air release valve. Then, the researchers pumped the cuff until they could not feel the pulses. The researchers deflated the cuff and observed the pulses on the arm curves of the respondents. The researchers put the tip of a stethoscope on the curves. They closed the close the valve and pumped the cuff. They read the scale above the systolic pressure during the previous palpation. Then, the researchers loosened the valve and deflated the cuff slowly. While promoting this procedure, the researchers heard the turbulence of systolic pressure. Then, they recorded the pressure based on the sound of the turbulence. When they heard the sound for a longer time, they would find a murmuring sound. This sound refers to the diastolic pressure. The researchers noted on what levels the sound occurred and on what levels the sound disappeared. Then, the researchers noted the measurement on the observational notes. The researchers measured the respondents twice to get the average result. During the measurements, the researchers provided a two-minute pause. The interpretation of the blood pressure measurement applied JNC VII criteria.

The second measurement, measuring the waist circumference, required the researchers to explain to the patients the objective of the measurement. The researchers also told them what to do during the measuring process. The researchers asked the respondents to lift their shirts. Then, they were asked to find the last ribs to determine the measurement starting point. After that, the researchers asked them to find the iliac crest. Then, the researchers asked them to mark the midpoint between the iliac crest point and the floating rib point. The respondents stood up and promoted normal respiration. The researchers began measuring the belly circumference. The researchers drew a line from the midpoint and continued it horizontally to determine the waist circumference. The researchers measured the circumference after the end of the respondent's respirations. In this process, the respondents were asked to widen their legs from 20 to 30 cm in width. Then, they were asked to hold their stomach while being measured. If the respondents had low belly fat, the researchers measured the most bulging belly. In this case, both the starting and the ending point of measurement should be at the most bulging belly. During the measuring process, the tape should not be folded. Then, the waist circumference should be approximate 0.1 cm. After the waist circumference, the researchers interpreted the test results based on the applied conditions. The normal interpretation refers to a waist circumference of less than 90cm for men and less than 80cm for women.

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The abnormal interpretation refers to a waist circumference of more than 90cm for men and more than 80cm for women.

RESULT AND DISCUSSION

The results of the measurements:

A. The characteristics of the respondents

Table 1 The characteristics of the respondents

Characteristics	N	Mean	Median	Modus	Min	Max
Groups of ages						
- 25 – 32	14					
- 33 – 40	8					
- 41 – 48	11	50,28	55,50	60	25	60
- 49 – 56	23					
- 57 – 64	44					
Blood pressure						
- Hypotension	11	Systole	Systole	Systole	S 60	S 90
- Normotension	13	144,70	140,00	130	D 119	D 195
- Hypertension	76	Diastole 88,72	Diastole 90,0	Diastole 90		
Waist circumference	23				50	114
- <80 cm	77	87,65	91,00	98		
- >80 cm						

Based on the table, the average age of the respondent is 50.28. The most dominant age is 60 years old. The table shows respondents with hypotension consisting of 11 people. The respondents with normal tension consist of 13 people. Then, the respondents with hypertension consist of 76 people. The table also shows the highest blood pressure is 195mmHg while the lowest blood pressure is 60mmHg. The table shows respondents with a waist circumference lesser than 80 cm consisting of 23 people. Of the respondents with a waist circumference of more than 80 cm are 77 people. The average circumference is 87.65 with the most dominant size being 98 cm. The largest waist circumference is 114 cm while the shortest one is 50 cm.

B. Data Analysis

Table 2 The Chi-Square Results between the Waist Circumference and Blood Pressure

Waist circumference	Blood pressure categories		Total
	Normal	Abnormal	
Normal	4	19	23
Abnormal	9	68	77

	Value	Df	Asymp. Sig
Pearson Chi Square	9.117a	1	0.003
Odds Ratio	13,421		

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Table 2 shows the measurement of waist circumference and obtains a p-value of 9.117. The significant level of this research is 0.003. Thus, the value is lower than 0.05 so H0 is accepted. It means there is a correlation between waist circumference and blood pressure.

C. **Discussion**

The Chi-Square table shows the chi-square Pearson is 0.003. The odd ratio is 13.421 indicating that people with waist circumference higher than 80cm, abnormal, will have hypertension risks of 13 times greater than those with normal waist circumference, less than 80cm. The accumulation of increased belly fat leads to central obesity. This obesity is a risk factor for cardiovascular diseases and hypertension (Guagnano et al., 2001; Sodi, 2021). Larger waist circumference influences the increased systolic and diastolic blood pressures. Men with larger waist circumference have greater blood pressure risks than men with shorter waist circumference. This matter happens due to belly fat easily releases the fat into blood veins than other limbs with fat. Waist circumference is correlated with abdominal obesity and fat cell enlargement. Thus, the cells can secrete metabolic products, such as proinflammatory cytokines, procoagulants, inflammatory peptides, and angiotensinogen. The other products of fat cells and the increased fatty acid within the plasma are correlated to metabolic diseases, such as diabetes, heart disease, hyperlipidemia, and hypertension (Arianti & Husna, 2015; Guagnano et al., 2001; Pazin et al., 2017)

People with obesity will suffer from problems due to an imbalance of adipocytes. The adipocytes attempt to maintain the energy balance by releasing the cytokines, such as IIL-6, TNF-α, and *monocyte chemotactic protein*-1 (MCP-1). This process indicates the initial inflammation so obesity is considered a chronic inflammation condition. Central obesity also decreases adipocytes. This matter leads to anti-atherogenic effects. Adipocytes are important to prevent leukocyte attachment on the endothelium. Adipocytes are important to hinder the performance of TNF-α to secrete the adhesive molecules on the endothelium. The decreased adipocytes facilitate the atherosclerosis process. The high lipolysis process causes higher oxidative stress. The occurrence of reactive oxygen species increases due to the increased activity of oxidase enzyme regulated by adiposity hormone. The increased oxidative stress disturbs the metabolism, both the nutrition of glucose on muscles and adipose tissue, the decreased insulin secretion and cellular damage. Thus, these problems lead to endothelial dysfunction, atherosclerosis, and even vascular disease (Kedokteran et al., n.d.; Mursiyam, 2009; Zhu et al., 2002).

CONCLUSION

From the results, a waist circumference, larger than 80 cm, has a greater risk, 13 times to suffer from hypertension than those with a waist circumference, lesser than 80 cm. The results also found some correlations between waist circumference and hypertension prevalence.

CONFLICT OF INTEREST

No conflict of interest occurred in this research. The researchers also declared that the research results did not have commercial and financial conflicts of interest.

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