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Significant Relationship between Hypertension and Obesity among Female Patients at A Hospital in Kupang, Indonesia

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Abstract

Background: Hypertension or high blood pressure is one of the most common non-communicable diseases found nowadays, affecting 1.28 billion people worldwide and causing about 7.5 million deaths annually. Many factors contribute to hypertension, one of which is obesity. This study aimed to explore further the relationship between hypertension and obesity, especially in female patients in Kupang, Indonesia.

Methods: This study was an analytical observational with a cross-sectional approach, including female patients visited the outpatient's clinic of internal medicine at a hospital in Kupang, Indonesia from July to August 2022. A purposive sampling technique was used. Data collection used an aneroid sphygmomanometer, stethoscope, and health scale. Data analysis was performed using the Chi-Square test. The strength of the correlation was tested with the coefficient of contingency.

Results: Of the 100 female patients, 28% had hypertension and 41% were obese. The majority were housewives, aged 46–66 years. Chi square test results showed a significant relationship between obesity and hypertension (p=0.006). However, the correlation test with the contingency coefficient showed a positive correlation with weak correlation (r=0.283).

Conclusion: There is a relationship between hypertension and obesity in female patients at a hospital in Kupang, Indonesia. This finding highlights the need for effective management and prevention strategies, as well as promoting healthy lifestyles.

Keywords: Hypertension, internal medicine clinic, obesity

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Introduction

Hypertension, also known as high blood pressure, is one of the most common non-communicable diseases today. Hypertension occurs when the pressure in the blood vessels increases chronically,[1] because the heart works harder to pump blood to meet the body's oxygen and nutrition needs.[2] A diagnosis of hypertension can be established if the systolic blood pressure is ≥140 mmHg and/or diastolic blood pressure is ≥90 mmHg.[3] Hypertension cases reach 22% of the global total population, causing 7.5 million deaths each year and accounting for 12.8% of all deaths. Moreover, data from the World Health Organization (WHO) in 2021 showed that about 1.28 billion of the world's population would suffer from hypertension, of which two-thirds are living in developing countries with lowand moderate income levels.[4] Southeast Asia ranks third in Asia whereas East Nusa Tenggara has a prevalence of hypertension of almost 30%. Kupang City is the capital city of East Nusa Tenggara Province and according to the Kupang City Health Profile, hypertension

was the third most common disease with 19.353 cases or 11.1% of all cases found in 2018.[5]

Obesity is one of the modifiable risk factor for hypertension.[6] There is an excessive buildup of fat due to the imbalance between energy intake and energy used over a long time.[7] Obesity is a condition when the body mass index measurement is equal to or exceeds 25.[8] In 2020, it was reported that 39% of the total adult population or around 2 billion people were overweight, with more than 600 million people being obese.[8] Countries in Southeast Asia are in a state of nutritional transition driven by rapid economic development and urbanization which has caused changes in population lifestyle. Unhealthy diets and lack of physical activity are the main causes of this condition. The ongoing nutritional transition in Southeast Asia is characterized by continuous nutritional and micro-nutritional deficiencies as well as the emergence nutritional problems. Although Southeast Asia has a low prevalence of obesity globally, there has been a worrying increase over the last 10–15 years.

Obesity has a significant effect on hypertension.[9] Hypertension occurs more frequently in obese people,[10] however, there are conflicting results.[11,12] Interestingly, obesity is one of the factors that can be modified with lifestyle changes. This study aimed to explore the relationship between hypertension and obesity, especially in female patients at the internal medicine outpatients clinic at one of the hospitals in Kupang, East Nusa Tenggara, Indonesia.

Methods

This study was an analytical observational study with a cross-sectional approach, conducted in July to August 2022 on female patients visited the internal medicine outpatients clinic of Prof. Dr. W. Z. Johannes General Hospital, Kupang, East Nusa Tenggara, Indonesia. Purposive sampling techniques was used. Ethical clearance was granted by the Research Ethics Committee Faculty of Medicine and Veterinary Medicine, University of Nusa Cendana with number 47/UN15.16/KEPK/2022.

Inclusion criteria in this study were female patients aged 18–65 years who visited the internal medicine outpatients clinic from July to August 2022 and had signed a willingness to participate. Exclusion criteria were patients who were pregnant, regularly smoked at least one cigarette a day, consumed more than one teaspoon of salt per day for the past month, physically inactive for the past week, and were categorized as severely stressed patients based on the depression anxiety stress scales-14 (DASS-14) questionnaire.

Blood pressure was measured directly using an aneroid sphygmomanometers and stethoscopes, then height and weight were

Table 1 Characteristic of Female Patients Visited the Outpatients Clinic at the Prof. Dr. W. Z. Johannes General Hospital in Kupang–Indonesia during July to August 2022 (n=100)

Characteristics	Nutritional Status		Blood Pressure	
	Obese n=41	Non-obese n=59	Hypertension n=28	No Hypertension n=72
Age (year)				
18–25	0	3	2	1
26–35	2	8	2	8
36–45	12	12	5	19
46–55	10	19	10	19
56–66	17	17	9	25
Occupation				
Housewife	22	35	13	44
Entrepreneur	0	6	1	5
Civil servant	15	6	8	13
Teacher	3	3	3	3
College student	0	2	1	1
Farmer	0	2	0	2
Nurse	1	2	2	1

Table 2 Relationship between Obesity and Hypertension

Nutritional Status	Blood Pressure				P-value	Correlation coefficient
	Non-Hypertension		Hypertension			
	n	%	n	%		
Non-obese	49	49	10	10	0.006*	0.283
Obese	23	23	18	18		

Note: significant if the p-value <0.05

measured directly using a health scale. Hypertension was designated if systolic blood pressure was ≥140 mmHg and/or diastolic blood pressure was ≥90 mmHg after two measurements. Obesity was designated if the body mass index (BMI) was >25.

Data analysis was performed using univariate analysis to determine the frequency distribution and proportion of each variable and bivariate analysis to determine the relationship between hypertension and obesity. The bivariate analysis used in this study was the Chi-Square test. Correlation tests were conducted using contingency coefficients.

Results

Of the 100 female patients, most were housewives (57%), aged 56–66 years (34%). Patients who were obese were 41% and hypertension was 28%. Interestingly, obese patients were dominated by the 56–66 year age group (17 of 41), whereas most hypertensive patients were in the 46–55 year age group (10 of 28) (Table 1).

There was a significant relationship between obesity and hypertension (p=0.006). The correlation test with the contingency coefficient yielded a correlation coefficient r-value of 0.283, indicating a positive correlation with a weak correlation strength (Table 2).

Discussion

This study shows that the proportion of respondents who are obese and hypertensive is less than non-obese and non-hypertensive respondents. This is in line with a study conducted at the regional hospital in Jember, Indonesia where out of 80 respondents, only 6 respondents (7.5%) were obese.[13] The demographic profile of these patient could naturally skew towards non-obese individuals due to socioeconomic or geographic factors. Likewise, another study conducted at a hospital in Palembang, where out of a total of 70 respondents, only 30 respondents (42.8%) who had hypertension.[14] The relationship between sociodemographic factors and the prevalence of hypertension in Indonesia includes variables of age, gender, education, occupation, and socioeconomic status. Based on the basic health research (*Riset kesehatan dasar*, Riskesdas), the prevalence of hypertension in Indonesia increased from 25.8% in 2013 to 34.1% in 2018. This is influenced by many factors such as unhealthy consumption patterns, low physical activity, and lifestyle behaviors such as smoking. Sociodemographic plays an important role, where the prevalence of hypertension tends to be higher in older age groups, individuals with low education and socioeconomic status, and in workers with low physical activity.[15]

This study has revealed a significant relationship between hypertension and obesity. This result is in accordance with a study conducted in Malang and Riau, Indonesia, which found a significant relationship between obesity and hypertension with a p-value of <0.05.[9,16] The prevalence of hypertension in the adult population also rises in parallel with the rising prevalence of overweight and obesity. In another study conducted in Rangpur, Bangladesh, it was found that the risk of developing hypertension was 1.61 times higher in overweight individuals and 2.35 times higher in obese individuals.[17]

In this study, a correlation test was also conducted using a contingency coefficient to find out the strength of the relationship between obesity and hypertension. The results obtained were a correlation coefficient (r) of 0.283, indicating that there was a positive correlation with a weak correlation strength. This result is in accordance with a study conducted to find out the relationship between BMI and blood pressure in medical students, which obtained a correlation coefficient of r= 0.302, 0.375, and 0.337, indicating that the correlation strength was weak.[18,19]

Obesity is one of the contributing factors

to hypertension. When a person is obese, the volume of blood required to transport oxygen to the body tissues increases due to a larger body mass.[20] This causes the heart to work harder than normal, resulting in blood pressure indirectly increases through inhibition of the sympathetic nervous system activity and the renin-angiotensin-aldosterone system which eventually leads to hypertension.[21] A study shows that with a weight gain of 10% will increase systolic blood pressure by 7 mmHg and for every 1 kilogram of weight loss will reduce systolic blood pressure by 0.33 mmHg and diastolic blood pressure by 0.43 mmHg.[22]

The Framingham study found that in obese respondents, there was a higher increase in blood pressure than non-obese respondents, in which 133 out of 165 respondents with hypertension were obese. According to this study, 65% of primary hypertension in women is due to excessive weight gain. In obesity, subcutaneous adipose tissue sometimes fails to store excess energy. This will lead to an increase in insulin levels in the blood. Increased levels of insulin in the blood cause increased sympathetic nervous system activity and increased retention of sodium kidneys in the proximal tubule through activation of the sodium hydrogen exchanger 3 (NHE3), which eventually causes an increase in blood pressure so that hypertension can occur.[23]

This study has several limitations and shortcomings. One of the limitations encountered in this study was the difficulty in finding study respondents due to the many exclusion criteria including only studying female gender and one hospital. Recommendations for further study are to ensure that the sample reflects the target population to increase generalizability of the results and to stratify the sample based on demographic factors to capture variation in the association between obesity and hypertension.

In conclusion, this study shows that obesity and hypertension have a significant relationship. Therefore it is necessary to do a good lifestyle management to prevent obesity and hypertension.

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