

## OBESITY AS AN INDICATOR OF HYPERTENSION AT THE ELDERLY HEALTH CARE POSYANDU IN SUSUKAN REJO VILLAGE PASURUAN

Lia Dwi Adinda Putri<sup>a</sup> | Ratna Roesardhyati<sup>b\*</sup> | Apriyani Puji Hastuti<sup>c</sup>

<sup>a,b,c</sup> Department of Nursing, Faculty of Health Science, Institute of Technology Science and Health dr. Soepraoen, Malang, Indonesia

\*Corresponding Author: [ratnaroes@itsk-soepraoen.ac.id](mailto:ratnaroes@itsk-soepraoen.ac.id)

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### ABSTRACT

**Introduction:** Among older adults, hypertension represents a significant public health concern that is often linked to excess body weight. Obesity, a modifiable risk factor, is known to elevate blood pressure and contribute to related complications in later years. This makes it a critical measure for assessment within elderly communities.

**Methods:** Employing a quantitative, descriptive correlational design with a cross-sectional method, this research was carried out at an Elderly Integrated Health Post in Susukan Rejo Village, Pasuruan. A total of 70 pre-elderly and elderly participants were included via total sampling. Obesity was evaluated using body mass index and waist circumference, and blood pressure was measured following standard protocols. Data were examined through univariate analysis and bivariate analysis using the Chi-square test to explore the relationship between obesity and hypertension.

**Results:** The study revealed a high prevalence of obesity according to both body mass index and waist circumference. A majority of respondents were diagnosed with hypertension, most commonly at stage 1. Bivariate analysis indicated a statistically significant association between obesity and hypertension, with greater obesity linked to more advanced stages of hypertension.

**Conclusions:** Obesity was found to be a strong predictor of hypertension in the studied elderly population. These findings highlight that weight management through lifestyle changes, consistent health monitoring, and community-led programs could be vital for lowering hypertension risk and enhancing health outcomes among older adults.

## Introduction

Hypertension represents a major public health problem and is often referred to as a “silent killer” because it usually develops without obvious symptoms and is frequently detected only after serious complications occur (Indri Mulyasari<sup>1</sup> et al., 2023). Low public awareness and infrequent health screenings contribute to many individuals being unaware that their blood pressure has reached dangerous levels (Usni et al., 2021). This condition constitutes an urgent public health concern, as delayed diagnosis and inadequate management significantly increase the risk of preventable morbidity, premature mortality, and long-term healthcare burden, particularly among vulnerable populations such as older adults. This is especially concerning given that hypertension is a primary risk factor for major cardiovascular conditions such as coronary heart disease, stroke, and chronic kidney failure (Putra et al., 2024; Syifa & Djuwita, 2023; Yanti et al., 2018).

Globally, hypertension affects more than 1.28 billion adults aged 30–79 years, with nearly two-thirds of cases occurring in low- and middle-income countries. Alarmingly, less than half of



individuals with hypertension are aware of their condition or receive adequate treatment, highlighting a substantial global health gap.

In Indonesia, hypertension continues to be a significant health issue, with prevalence increasing markedly with age (Sari Novianti et al., 2023). Data from the 2023 Indonesian Health Survey show that hypertension prevalence rises progressively from young adulthood and reaches its peak among individuals aged 75 years and older (*Penerbit STIKes Majapahit Mojokerto BUKU AJAR*, 2022). These findings indicate that older adults are disproportionately affected and contribute substantially to the national burden of non-communicable diseases (Badriyah & Pratiwi, 2024). This situation is further aggravated by inadequate early detection and suboptimal management of modifiable risk factors at the community level (Darwis et al., 2025; Saraswati et al., 2021).

Obesity is widely recognized as an important modifiable risk factor for hypertension. It is defined as excessive or abnormal fat accumulation resulting from a long-term imbalance between energy intake and expenditure, influenced by genetic, environmental, dietary, and behavioral factors (Aulia et al., 2024). In adults and older populations, obesity not only reduces quality of life but also significantly increases the risk of chronic degenerative diseases, including hypertension (Tiara, 2020).

Globally, the prevalence of obesity has increased dramatically over recent decades. The World Health Organization reports that worldwide obesity has nearly tripled since 1975, with approximately 39% of adults classified as overweight and 13% as obese in 2016. In Indonesia, data from the 2016 National Health Indicator Survey showed a substantial increase in obesity prevalence compared with the 2013 Basic Health Research, reaching 33.5% among adults (Archer et al., 2018). This trend is of particular concern given the strong association between obesity and non-communicable diseases (Al Adami pradana et al., 2021; Asyfh et al., 2020).

The relationship between obesity and hypertension can be explained through several physiological mechanisms (Riyada et al., 2024). Increased body mass in obese individuals leads to higher blood volume requirements to supply oxygen and nutrients to body tissues, thereby increasing cardiac output and cardiac workload (Afrilia et al., 2024; Ayu Pradika et al., 2022; Marlina Susianti, 2024). Furthermore, obesity triggers the sympathetic nervous system and the renin-angiotensin-aldosterone system. This activation leads to sodium and fluid retention, increases blood volume, and results in higher systemic blood pressure. (Indri Mulyasari1 et al., 2023).

Initial observations at the Elderly Integrated Health Post in Susukan Rejo Village, Pasuruan Regency, indicated a high rate of hypertension in older adults with obesity. Among 35 obese elderly participants assessed, most had blood pressure readings above the normal range, classified from stage 1 to stage 3 hypertension based on Joint National Committee 7 guidelines. These early results point to a likely link between obesity and hypertension in the elderly community of this area. (Dinas Kesehatan Kabupaten Kampar, 2021).

In response to this problem, non-pharmacological interventions play an essential role in controlling obesity and preventing hypertension among older adults. Such interventions include the implementation of balanced dietary regulation to reduce excessive caloric and sodium intake, promotion of regular and age-appropriate physical activity to improve cardiovascular fitness, routine monitoring of body weight and blood pressure for early detection, and continuous health education aimed at increasing awareness and adherence to healthy lifestyles. Support from family members and healthcare providers is also crucial to ensure consistency and sustainability of these interventions, thereby reducing the risk of hypertension and its related complications in obese elderly individuals (Oksidriyani, 2024).

Based on this background, this study was conducted to examine the association between obesity and the occurrence of hypertension among older adults attending the Integrated Elderly

Health Post in Susukan Rejo Village, Pasuruan Regency. In particular, the study aims to describe the prevalence of obesity and hypertension and to assess obesity as an indicator of hypertension occurrence at the community level.

## Methods

This research utilized a quantitative, descriptive correlational design with a cross-sectional approach to analyze the relationship between obesity (the independent variable) and hypertension (the dependent variable) at one specific time. The study was carried out during the first week of October 2025 at the Elderly Integrated Health Post in Susukan Rejo Village, Pasuruan Regency. The target population included all 70 pre-elderly and elderly individuals registered at the post. A total sampling method (a non-probability technique) was employed, meaning every eligible member of the population was invited to participate.

Data were gathered via direct observation and physical measurements. Obesity was evaluated using two indicators: Body Mass Index (BMI) and waist circumference. A digital scale, stadiometer, and measuring tape were used to collect these measurements. BMI was classified into underweight, normal, overweight, and obesity classes I and II. Central obesity was defined as a waist circumference  $\geq 90$  cm for men and  $\geq 80$  cm for women. Blood pressure was measured with a digital sphygmomanometer after participants had rested, and readings were categorized as normal, prehypertension, stage I hypertension, or stage II hypertension. All data were documented on a standardized observation form.

Following collection, the data underwent processing stages including editing, coding, scoring, tabulation, and cleaning to ensure accuracy. Microsoft Excel and IBM SPSS Statistics version 27 were used for analysis. Univariate analysis summarized the frequency distributions of participant characteristics, obesity status, and blood pressure categories. Bivariate analysis was conducted to examine the association between obesity status and hypertension degree using cross-tabulation and the Chi-square test, as both variables were categorical. Statistical analysis was performed using IBM SPSS Statistics version 27 with a significance level set at  $p < 0.05$ . The study received ethical clearance from the Health Research Ethics Committee of ITS RS dr. Soepraoen Malang. Ethical principles of autonomy, justice, beneficence, non-maleficence, and confidentiality were rigorously maintained throughout the research.

## Results

### *Univariate Analyze*

The following tables provide respondent characteristics, hypertension status, and obesity status based on waist circumference and body mass index (BMI). The primary traits of the study population are summed up with descriptive explanations.

**Table 1. Respondent Characteristics**

Characteristics	Category	Frequency (n)	Percentage (%)
Sex	Female	48	68.6
	Male	22	31.4
Age	45–59 years	34	48.6
	60–74 years	18	25.7
	75–90 years	18	25.7
Education	Higher education	8	11.4
	Elementary school	19	27.1
	Junior high school	11	15.7



Occupation	Senior high school	32	45.7
	Laborer	3	4.3
	Housewife	44	62.9
	Farmer	8	11.4
	Civil servant	5	7.1
	Private employee	6	8.6
	Self-employed	4	5.7
Medication consumption	No	7	10.0
	Yes	63	90.0
Smoking habit	No	57	81.4
	Yes	13	18.6
<b>Total</b>		<b>70</b>	<b>100.0</b>

Table 1 shows that the majority of respondents were female (68.6%). Most respondents were aged 45–59 years (48.6%), while those aged 60–74 years and 75–90 years each accounted for 25.7%. The highest level of education was senior high school (45.7%). Most respondents were housewives (62.9%). The majority reported consuming medication (90.0%) and did not have a smoking habit (81.4%).

**Table 2 Hypertension Status**

<b>Hypertension Status</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
Normal	22	31.4
Prehypertension	11	15.7
Hypertension Stage 1	32	45.7
Hypertension Stage 2	5	7.1
<b>Total</b>	<b>70</b>	<b>100.0</b>

Table 2 indicates that most respondents experienced hypertension stage 1 (45.7%). Respondents with normal blood pressure accounted for 31.4%, while prehypertension was observed in 15.7% of respondents. The smallest proportion consisted of respondents with hypertension stage 2 (7.1%).

**Table 3 Obesity Status Based on Body Mass Index**

<b>BMI Category</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
Underweight	6	8.6
Normal weight	24	34.3
Overweight	11	15.7
Obesity class I	28	40.0
Obesity class II	1	1.4
<b>Total</b>	<b>70</b>	<b>100.0</b>

Table 3 shows that the largest proportion of respondents was classified as obesity class I (40.0%). Respondents with normal body weight accounted for 34.3%, while overweight respondents represented 15.7%. Underweight and obesity class II were found in 8.6% and 1.4% of respondents, respectively.

**Table 4 Obesity Status Based on Waist Circumference**

<b>Category</b>	<b>Male</b>	<b>Female</b>	<b>Percentage (%)</b>
Normal	9	11	28.6
High risk	13	37	71.4

Total	22	48		
		70	100.0	

Table 4 demonstrates that the majority of respondents had a high-risk waist circumference (71.4%), indicating a high prevalence of central obesity among the study population. Only 28.6% of respondents were categorized as having a normal waist circumference.

### **Bivariate Analyze**

In addition to categorical analysis, numerical variables were summarized using measures of central tendency. The mean age of respondents was  $63.7 \pm 9.4$  years, with a median age of 62 years. The mean body mass index (BMI) was  $27.1 \text{ kg/m}^2$ , with a median BMI of  $26.8 \text{ kg/m}^2$ , indicating that most respondents tended to be in the overweight to obese category.

The bivariate analysis examined the association between obesity status and hypertension degree among respondents. The relationship was analyzed using cross-tabulation and the Chi-square test.

**Table 5 Crosstabulation of Obesity and Hypertension**

Obesity Status	Normal HT	Prehypertension	Hypertension Stage 1	Hypertension Stage 2	Total
Underweight	1	2	3	0	6
%	1.4	2.9	4.3	0.0	8.6
Normal weight	17	3	4	0	24
%	24.3	4.3	5.7	0.0	34.3
Overweight	2	3	5	1	11
%	2.9	4.3	7.1	1.4	15.7
Obesity class I	2	3	20	3	28
%	2.9	4.3	28.6	4.3	40.0
Obesity class II	0	0	0	1	1
%	0.0	0.0	0.0	1.4	1.4
Total	22	11	32	5	70
%	31.4	15.7	45.7	7.1	100.0

Table 5 shows the distribution of obesity status across hypertension categories. Overall, among 70 respondents, the largest group consisted of individuals with obesity class I and hypertension stage 1, totaling 20 respondents (28.6%). This was followed by respondents with normal body weight and normal blood pressure, accounting for 17 respondents (24.3%). The distribution indicates a tendency for higher hypertension stages to occur more frequently among respondents with higher obesity categories.

**Table 6 Chi-Square Test Results**

Test	Value	Degrees of Freedom (df)	Asymptotic Significance (2-sided)
Pearson Chi-Square	45.071 <sup>a</sup>	12	0.000
Likelihood Ratio	39.343	12	0.000
Linear-by-Linear Association	19.053	1	0.000
Number of Valid Cases	70		



Based on Table 6, the Chi-square test yielded a Pearson Chi-square value of 45.071 with 12 degrees of freedom. The asymptotic significance value ( $p = 0.000$ ) was far below the significance threshold of  $\alpha = 0.05$ , indicating a statistically significant association between obesity status and hypertension degree. These findings provide strong statistical evidence that higher levels of obesity are associated with higher degrees of hypertension among the elderly population in this study.

## Discussion

### *Hypertension Status*

The results of this study indicate that the majority of respondents experienced hypertension, with the highest proportion classified as stage 1 hypertension. This finding confirms that hypertension is a prominent health problem among pre-elderly and elderly individuals at the Elderly Integrated Health Post in Susukan Rejo Village. This condition aligns with national data showing that the prevalence of hypertension increases with advancing age due to physiological changes in the cardiovascular system, including reduced arterial elasticity and increased peripheral vascular resistance (Darwis et al., 2025).

From a theoretical perspective, aging is associated with structural and functional changes in blood vessels, such as arterial stiffening and decreased compliance, which contribute to elevated systolic blood pressure (Asyfah et al., 2020). In addition, the sensitivity of baroreceptors involved in blood pressure regulation declines with age, impairing the body's ability to maintain optimal blood pressure homeostasis. As a result, older adults are more vulnerable to hypertension even in the absence of obvious clinical symptoms, reinforcing the concept of hypertension as a *silent* (Yanti et al., 2018).

The presence of respondents with normal blood pressure and prehypertension indicates opportunities for primary and secondary prevention through routine blood pressure monitoring and lifestyle modification. However, the high proportion of respondents with stage 1 hypertension suggests that many individuals have already entered a phase requiring structured interventions to prevent disease progression and target organ damage.

### *Obesity Status Based on Body Mass Index*

The findings of this study show that most respondents were classified as having obesity class I based on body mass index (BMI). This result demonstrates that excess body weight and obesity are prevalent health concerns among the elderly population in the study area. This condition is consistent with theoretical explanations that aging is accompanied by decreased muscle mass and basal metabolic rate, leading to increased fat accumulation even without a significant rise in caloric intake (Gadde et al., 2021).

Obesity assessed using BMI reflects overall excess body mass; however, in older adults, this condition is often exacerbated by reduced physical activity and age-related changes in body composition. Excess adipose tissue promotes chronic low-grade inflammation, which contributes to metabolic disturbances and increases the risk of cardiovascular diseases, including hypertension. These mechanisms support the role of obesity as a major risk factor for elevated blood pressure (Tiara, 2020).

The results of this study are consistent with previous research by Asyfah et al. (Asyfah et al., 2020), which reported a significantly higher risk of hypertension among individuals with obese BMI classifications compared to those with normal BMI. Therefore, the findings of this study reinforce the relevance of BMI as an initial screening indicator for hypertension risk among community-dwelling elderly populations.

### *Obesity Status Based on Waist Circumference*



The results indicate that the majority of respondents had a high-risk waist circumference, suggesting a high prevalence of central obesity. Central obesity is considered particularly hazardous because it reflects the accumulation of visceral fat, which is metabolically active and strongly associated with cardiovascular and metabolic disorders (Kementerian Kesehatan RI, 2018).

Pathophysiologically, visceral fat contributes to increased secretion of pro-inflammatory adipokines, insulin resistance, and activation of the renin-angiotensin-aldosterone system (RAAS). Activation of this system promotes sodium and fluid retention, increases blood volume, and elevates peripheral vascular resistance, ultimately leading to increased blood pressure (Indri Mulyasari et al., 2023).

This finding is consistent with previous studies showing that waist circumference is a stronger predictor of hypertension than BMI, particularly among adults and older adults (Oksidriyani, 2024). Consequently, waist circumference measurement represents a simple yet effective screening tool for identifying individuals at high risk of hypertension in primary healthcare and community-based settings.

#### ***Association Between Obesity and Hypertension***

The bivariate analysis demonstrated a statistically significant association between obesity and hypertension severity. Higher levels of obesity were associated with higher stages of hypertension, supporting the study hypothesis that obesity serves as an indicator of hypertension occurrence among older adults.

Theoretically, the relationship between obesity and hypertension is mediated by multiple physiological mechanisms. Increased adiposity leads to elevated cardiac output due to higher tissue perfusion demands. Additionally, obesity stimulates sympathetic nervous system activity and RAAS activation, both of which contribute to sustained increases in blood pressure (Shariq & Mckenzie, 2020). These mechanisms explain why respondents with obesity class I and II in this study were more frequently classified as having stage 1 and stage 2 hypertension.

The findings are consistent with previous studies by Yanti et al. (2018) and Natalia et al. (2015), which reported significant associations between obesity and hypertension among adult and elderly populations. Therefore, the results of this study provide additional empirical evidence that obesity management should be prioritized as a key strategy for hypertension prevention and control at the community level.

#### **Conclusion**

Based on the findings of this study on obesity as an indicator of hypertension among older adults at the Elderly Integrated Health Post in Susukan Rejo Village, Pasuruan, it can be concluded that the prevalence of obesity among the elderly was high, as assessed by both body mass index (BMI) and waist circumference measurements. This indicates a substantial burden of excessive nutritional status in the study population. In addition, blood pressure measurements revealed that most respondents were classified as hypertensive, particularly in stages 1 and 2, demonstrating that hypertension is a common health condition among older adults in this area. Furthermore, the Chi-square analysis showed a statistically significant association between obesity and the occurrence of hypertension ( $p\text{-value} = 0.000 < 0.05$ ), confirming that obesity serves as a strong indicator of hypertension among the elderly. These findings suggest that higher levels of obesity contribute to an increased risk of hypertension, emphasizing the importance of obesity prevention and control as a strategy to reduce hypertension prevalence in older populations.

Based on these conclusions, it is recommended that older adults maintain a healthy body weight through balanced dietary patterns, reduced intake of salt, fat, and sugary foods, and regular physical activity such as elderly exercise programs or daily walking, accompanied by routine blood pressure monitoring. Community health cadres and managers of elderly health

posts are encouraged to strengthen regular monitoring of body weight, waist circumference, and blood pressure, provide continuous health education on obesity and hypertension prevention, and organize age-appropriate group physical activities. Healthcare professionals should enhance promotive and preventive efforts by delivering nutritional counseling, lifestyle education, and early screening for obesity and hypertension, as well as ensuring adherence to treatment among diagnosed patients. Future researchers are advised to include additional variables such as dietary habits, physical activity, stress, family history, and salt intake, apply larger and more diverse samples, and use longitudinal designs to better explore causal relationships. In addition, village authorities and primary healthcare centers are expected to support sustainable community-based programs focused on obesity and hypertension prevention, including the provision of elderly-friendly physical activity facilities and regular health screening initiatives to improve the quality of life of older adults..

### Ethics clearance and participation consent

- A statement on ethics approval and consent must be included in manuscripts reporting research involving human subjects, human data, or human tissue, even in cases when approval was not required
- If applicable, include the name of the ethics committee that approved the study along with the committee's reference number

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