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Association between anxiety levels and hypertension among older adults

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Abstract

Background: As individuals age, older adults experience significant physiological decline, including reduced vascular elasticity, which contributes to the high prevalence of cardiovascular diseases. Biologically, persistent anxiety triggers the release of stress hormones, such as catecholamines and cortisol, which increase sympathetic nervous system activity and subsequently elevate blood pressure.
Purpose: To examine the association between anxiety levels and hypertension among older adults.
Method: This study employed a correlational research design with a cross-sectional approach. A total of 313 older adults from Cimanggu Village were recruited using a cluster random sampling technique. Data were collected using a structured closed-ended questionnaire that had been tested for validity and reliability. Bivariate analysis was performed using the Chi-square test.
Results: Most respondents experienced severe anxiety (203; 64.9%). Furthermore, hypertension was identified in 195 respondents (62.3%). A statistically significant relationship was found between anxiety levels and the incidence of hypertension among older adults ($p < 0.05$).
Conclusion: Anxiety levels were significantly associated with hypertension among older adults. These findings suggest that hypertension management in older adults should adopt a comprehensive approach that addresses both physical and psychological aspects of health.

Keywords: Anxiety; Hypertension; Older Adult.

INTRODUCTION

Increasing life expectancy is one of the key indicators of success in health sector development. Consequently, the proportion of the older adult population continues to rise worldwide, including in Indonesia. The growing number of older adults has been accompanied by an increasing burden of health problems, particularly non-communicable diseases (NCDs). Aging is associated with progressive physiological decline that predisposes older adults to chronic health conditions, among which hypertension is one of the most prevalent. Hypertension in older adults represents not only a major clinical concern but also a significant public health challenge due to its association with increased risks of disability, reduced quality of life, and mortality resulting from cardiovascular complications (World Health Organization, 2025).

Hypertension remains one of the leading contributors to the global burden of disease. According to the World Health Organization (WHO), approximately 1.28 billion adults worldwide are living with hypertension, yet nearly half are unaware of their condition. Hypertension is widely recognized as a silent killer because it is often asymptomatic until serious complications, such as stroke, coronary artery disease, chronic kidney disease, or heart failure, develop. The prevalence of hypertension increases substantially with advancing age due to age-related structural and functional changes in the cardiovascular system, making older adults

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particularly vulnerable to this condition (World Health Organization, 2023).

Indonesia faces a similar public health challenge. According to the 2023 Indonesian Health Survey, hypertension remains one of the most prevalent non-communicable diseases, particularly among individuals aged 60 years and older. As the older adult population continues to expand, the number of individuals affected by hypertension is expected to increase unless effective prevention and control strategies are implemented. This trend is likely to place greater demands on healthcare services, increase healthcare expenditures, and intensify the burden on families responsible for caring for older adults with hypertension-related complications (Ministry of Health of the Republic of Indonesia, 2023).

The development of hypertension in older adults is influenced by multiple interacting factors. In addition to biological determinants, such as age, sex, and family history, behavioral and psychological factors also contribute to elevated blood pressure. Current hypertension management strategies have predominantly focused on lifestyle modification, including dietary interventions, regular physical activity, smoking cessation, and adherence to antihypertensive medication. However, psychological factors also play a substantial role in both the development of hypertension and the effectiveness of blood pressure control.

Anxiety is one of the most common psychological conditions experienced by older adults. It is defined as an emotional response to perceived threats, uncertainty, or life changes that are considered stressful or potentially harmful. Among older adults, anxiety may arise from various circumstances, including declining physical health, the loss of a spouse, reduced functional independence, financial difficulties, social isolation, and concerns about the future. When anxiety persists over an extended period, it may disrupt physiological homeostasis and negatively affect overall health status (Stuart, 2023; Kaplan, & Sadock, 2021).

From a physiological perspective, anxiety activates both the sympathetic nervous system and the hypothalamic–pituitary–adrenal (HPA) axis, resulting in increased secretion of catecholamines (epinephrine and norepinephrine) and cortisol. These neuroendocrine responses increase heart rate, promote peripheral vasoconstriction, and enhance cardiac output, ultimately leading to elevated blood pressure. When this physiological response becomes chronic, sustained blood pressure elevation may occur, thereby increasing the risk of developing hypertension or exacerbating pre-existing hypertension (Hall & Hall, 2021; Guyton, & Hall, 2021).

Beyond its physiological effects, anxiety also influences health-related behaviors. Older adults experiencing anxiety are more likely to develop sleep disturbances, experience changes in appetite, engage in insufficient physical activity, demonstrate poor adherence to antihypertensive medication, and avoid routine medical check-ups. These behavioral changes may compromise blood pressure control and increase the risk of cardiovascular complications. Therefore, hypertension management in older adults should not be limited to physical treatment alone but should also incorporate assessment and management of patients' psychological well-being.

Numerous studies have investigated the relationship between psychological factors and blood pressure; however, the findings remain inconsistent. Several studies have reported that individuals with higher levels of anxiety are more likely to experience elevated blood pressure than those with lower anxiety levels. Conversely, other studies have suggested that this relationship is influenced by various factors, including age, family support, health status, treatment adherence, and lifestyle. These inconsistent findings indicate that the association between anxiety and hypertension among older adults requires further investigation across different populations and sociocultural settings. A study reported a significant association between anxiety levels and the occurrence of hypertension among older adults attending the Padalarang Community Health Center, West Bandung Regency (Amanda, Juhaeriah, & Roswendi, 2024).

In clinical practice, blood pressure assessment has become a routine component of healthcare services for older adults, whereas evaluation of psychological conditions, particularly anxiety, remains relatively uncommon. Comprehensive healthcare should encompass not only the management of physical illness but also the assessment of patients'

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mental and emotional well-being. Early identification of anxiety enables healthcare professionals to implement appropriate psychological interventions, including counseling, health education, relaxation techniques, and family support, as integral components of hypertension management.

Failure to recognize anxiety at an early stage may contribute to persistent elevations in blood pressure, accelerating the development of cardiovascular complications, reducing quality of life, increasing dependence on family caregivers, and imposing a greater burden on healthcare systems. Conversely, effective management of psychological factors is expected to optimize hypertension control and reduce the risk of long-term cardiovascular complications.

According to the 2024 report from the Sukabumi District Health Office, a total of 5,940 cases of hypertension were recorded among older adults in Sukabumi District. Of all community health centers (Puskesmas) in the district, Cikembar Community Health Center ranked fifth, accounting for 328 cases (5.52%). Data from Cikembar Community Health Center further indicated that older adults with hypertension were distributed across ten villages within its service area. Among these villages, Cimanggu ranked second, with 372 reported cases, representing 29.78% of all hypertension cases within the health center's catchment area (Ministry of Health of the Republic of Indonesia, 2024).

These findings highlight that hypertension among older adults remains a significant public health concern influenced by multiple determinants, including psychological factors such as anxiety. Although the association between anxiety and hypertension has been investigated in previous studies, the available evidence remains inconsistent, indicating the need for further research across different populations and community settings to strengthen the existing body of evidence. Therefore, this study aims to examine the association between anxiety levels and hypertension among older adults. The findings are expected to provide evidence to support the development of more comprehensive gerontological nursing interventions by integrating both physical and psychological approaches into hypertension prevention and management strategies for older adults.

RESEARCH METHOD

This study employed a quantitative correlational design with a cross-sectional approach to examine the association between anxiety levels and hypertension among older adults. The study population comprised all older adults residing in Cimanggu Village, within the service area of the Cikembar Community Health Center, Sukabumi Regency, Indonesia, totaling 1,489 individuals. A sample of 313 participants was selected using a cluster random sampling technique.

The inclusion criteria were older adults aged ≥60 years, residing in the study area for at least six months, able to communicate effectively, willing to participate in the study, and who provided written informed consent. The exclusion criteria included older adults with severe cognitive impairment, hearing or speech disorders that interfered with communication, severe physical illness preventing participation, or incomplete questionnaire data.

Data were collected using the Geriatric Anxiety Inventory (GAI) to assess anxiety levels and a calibrated sphygmomanometer to measure blood pressure. The validity of the GAI was evaluated using the Pearson product–moment correlation test, with all 18 questionnaire items demonstrating satisfactory validity. Reliability testing yielded a Cronbach's alpha coefficient of 0.86, indicating good internal consistency.

Anxiety levels were categorized into no anxiety, mild anxiety, and severe anxiety based on the total GAI score according to the instrument guidelines. Blood pressure was classified according to standard hypertension criteria into normotensive (systolic blood pressure <140 mmHg and diastolic blood pressure <90 mmHg) and hypertensive (systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg).

Data analysis included descriptive (univariate) statistics to summarize participant characteristics and study variables, and inferential (bivariate) statistics using the Chi-square test to examine the association between anxiety levels and hypertension. Statistical significance was established at a p-value of <0.05.

Ethical approval for the study was obtained from the Research Ethics Committee of STIKes Sukabumi (Ethics Approval No. 002227/KEP STIKES SUKABUMI/2025). All participants received an explanation of the study objectives and procedures and provided written informed consent prior to data collection. Confidentiality and anonymity were maintained throughout the research process.

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RESEACH RESULTS

Table 1. Characteristics of Respondents (N=313)

Variables	Results
Age (Mean ± SD)(Range)(Years)	(68.85 ± 6.590) (60-90)
Age (n%)	
60-74	210/67.1
75-90	103/32.9
Gender (n%)	
Male	137/43.8
Female	176/56.2
Occupation (n%)	
Employed	127/40.6
Unemployed	186/59.4
Education (n%)	
Elementary School	192/61.3
Junior High School	36/11.5
Senior High School	67/21.4
University	18/5.8
Anxiety (n%)	
No Anxiety	16/5,1
Mild Anxiety	94/30.0
Severe Anxiety	203/64.9
Hypertension (n%)	
Yes	195/62.3
No	118/37.7

Table 1 summarizes the demographic and clinical characteristics of the 313 study participants. The mean age of the respondents was 68.85 years (range: 60–90 years). Most participants were female (56.2%, n = 176). Regarding employment status, the majority were unemployed (59.4%, n = 186). In terms of educational attainment, most respondents had completed primary school (61.3%, n = 192).

Regarding the study variables, severe anxiety was the most prevalent category, affecting 203 respondents (64.9%). Hypertension was identified in 195 respondents, accounting for 62.3% of the study population, while the remaining 118 respondents (37.7%) had normal blood pressure.

Table 2. Bivariate Results with Chi Square

Variable	Hypertension		p-value
	Yes (n=195)	No (n=118)	
Anxiety (n/%)			
No Anxiety	7/3.6	9/7.6	
Mild Anxiety	32/16.4	62/52.6	0.000
Severe Anxiety	156/80.0	47/39.8	

Table 2 presents the results of the Chi-square analysis, which demonstrated a statistically significant association between anxiety levels and hypertension among older adults ($p < 0.001$).

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DISCUSSION

The findings of this study showed that the majority of respondents experienced severe anxiety (64.9%). This finding indicates that anxiety remains a common psychological problem among older adults. Such a condition may be attributed to the biological, psychological, and social changes associated with the aging process, including declining physical function, increased dependence on others, loss of a spouse, and concerns regarding deteriorating health. These age-related changes make older adults more vulnerable to emotional disturbances than younger populations (World Health Organization, 2025; Stuart, 2023; Townsend, & Morgan, 2021).

The high prevalence of severe anxiety observed in this study may be related to the respondents' advanced age, with a mean age of 68.8 years. Advancing age is one of the major risk factors for hypertension because the aging process is accompanied by progressive vascular changes, including reduced arterial elasticity, increased arterial stiffness, impaired baroreceptor sensitivity, and elevated peripheral vascular resistance. These physiological alterations contribute to a gradual increase in systolic blood pressure with age. In addition to these biological changes, older adults frequently experience psychosocial challenges, such as declining physical capacity, increased dependence on family members, and the loss of spouses or peers, all of which may increase susceptibility to anxiety. The combined effects of biological aging and psychological stress may therefore increase the risk of hypertension in this population (Bowling, Lee, & Williamson, 2021; Turana, Tengkawan, Chia, Shin, Chen, Park, Tsoi, Buranakitjaroen, Soenarta, Siddique, Cheng, Tay, Teo, Wang, & Kario, 2021).

This study also found that most respondents were female (56.2%). This finding suggests that older women constituted a larger proportion of participants with hypertension accompanied by anxiety than older men. One possible explanation is the decline in estrogen levels following menopause. Estrogen plays an important role in maintaining endothelial function, preserving arterial elasticity, and inhibiting the progression of atherosclerosis. Consequently, reduced estrogen levels contribute to increased arterial stiffness, thereby predisposing older women to elevated blood pressure. Furthermore, older women are generally more susceptible to psychological distress, including anxiety, because of hormonal changes, widowhood, declining physical function, and changes in social roles during later life. These factors may stimulate sympathetic nervous system activity, thereby contributing to elevated blood pressure (Ghazi & Bello, 2021; Turana et al., 2021).

The majority of respondents were unemployed (59.4%), a condition that is commonly associated with retirement or age-related declines in physical capacity that limit productive activities. Unemployment or retirement in later life may contribute to increased anxiety by reducing opportunities for physical activity, social interaction, and engagement in meaningful or productive roles. These circumstances may foster feelings of helplessness, loneliness, and concerns about financial security or health status, thereby increasing the risk of anxiety. Such psychosocial stressors may activate the sympathetic nervous system, leading to sustained elevations in blood pressure and an increased risk of hypertension (Turana et al., 2021; Lim, Solmi, & Cortese, 2021; Santrock, 2020; Ministry of Health of the Republic of Indonesia, 2024).

The study also found that the majority of respondents had completed only primary school education (61.4%). Lower educational attainment is frequently associated with limited ability to access, understand, and apply health-related information. Inadequate health literacy may reduce older adults' understanding of chronic disease management, including hypertension, thereby increasing concerns about their health status. Educational attainment also influences an individual's ability to cope effectively with stress and adapt to health-related challenges (Notoatmodjo, 2020; Nutbeam, 2021).

The findings further revealed that the majority of respondents had hypertension, indicating that hypertension remains one of the most prevalent health problems among older adults. The high prevalence of hypertension in this population is largely attributable to age-related structural and functional changes in the cardiovascular system, including reduced arterial elasticity, increased arterial stiffness, and impaired vascular capacity to maintain blood pressure homeostasis. These physiological changes contribute to progressive increases in both systolic

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and diastolic blood pressure with advancing age. This finding is consistent with previous studies identifying older age as an independent risk factor for hypertension due to degenerative changes within the vascular system (Turana et al., 2021).

The respondents' mean age of 68.8 years may have substantially contributed to the high prevalence of hypertension observed in this study. Aging is associated with increased peripheral vascular resistance and decreased arterial compliance, both of which predispose older adults to elevated blood pressure. Consequently, the prevalence of hypertension rises markedly after the age of 60 years, making older adults a priority population for hypertension prevention and control programs (Unger, Borghi, Charchar, Khan, Poulter, Prabhakaran, & Schutte, 2020; Ministry of Health of the Republic of Indonesia, 2024).

The predominance of female respondents may also explain the high prevalence of hypertension observed in this study. Following menopause, women experience a decline in estrogen levels, which normally exert protective effects on the cardiovascular system. Reduced estrogen levels contribute to increased arterial stiffness and vascular dysfunction, thereby elevating the risk of hypertension. As a result, the prevalence of hypertension among older women is generally higher than that among men of the same age group (Tsao, Aday, Almarzooq, Anderson, Arora, Avery, & American Heart Association, 2023; Bushnell, Kernan, Sharrief, Chaturvedi, Cole, Cornwell III, & Whelton, 2024).

Unemployment or retirement may also have contributed to the occurrence of hypertension among the respondents. Older adults without regular daily activities are more likely to engage in lower levels of physical activity, resulting in suboptimal metabolic function. Physical inactivity is associated with weight gain, insulin resistance, and increased arterial stiffness, all of which contribute to elevated blood pressure. Moreover, the psychological consequences of reduced productive engagement may further impair blood pressure control (World Health Organization, 2023; Ministry of Health of the Republic of Indonesia, 2024).

The majority of respondents had only primary school education (61.4%), which may have influenced their ability to obtain, comprehend, and apply health information effectively. Limited educational attainment is closely associated with lower health literacy, reducing older adults' understanding of hypertension risk factors, medication adherence, dietary management, and stress reduction strategies. Consequently, hypertension management may become less effective, while anxiety related to the disease may increase. Lower educational attainment has also been associated with reduced problem-solving and health-related decision-making abilities, thereby increasing the likelihood of uncontrolled hypertension (Turana et al., 2021; Lim et al., 2021).

The high prevalence of hypertension observed in this study cannot be explained solely by biological changes associated with aging but should also be considered in the context of the psychological challenges experienced by older adults. Older individuals frequently encounter major life transitions, including declining physical function, the onset of chronic illnesses, reduced social roles, bereavement, and increasing dependence on family members. These circumstances may serve as persistent sources of psychological stress, contributing to dysregulation of blood pressure control. Therefore, hypertension in older adults should be regarded as a multifactorial condition resulting from the complex interaction of biological, psychological, and social determinants (Turana et al., 2021).

The bivariate analysis demonstrated a statistically significant association between anxiety levels and hypertension among older adults ($p < 0.001$). Because the p-value was below the significance threshold of 0.05, the null hypothesis was rejected, indicating that anxiety level was significantly associated with the occurrence of hypertension in the study population. These findings suggest that psychological factors should be considered an integral component of hypertension management in older adults (Dahlan, 2021; Polit & Beck, 2021).

This association can be explained by the physiological response to anxiety. Anxiety activates both the sympathetic nervous system and the hypothalamic–pituitary–adrenal (HPA) axis, leading to increased secretion of catecholamines, including epinephrine and norepinephrine, as well as cortisol. These neuroendocrine responses increase heart rate, induce peripheral vasoconstriction, and enhance cardiac output, ultimately resulting in elevated blood

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pressure. When anxiety becomes chronic, these physiological responses may persist, contributing to sustained hypertension (Hall & Hall, 2021; Stuart, 2023).

The findings of the present study are consistent with previous evidence demonstrating a significant association between anxiety and hypertension among older adults. A previous study also reported a significant relationship between anxiety levels and hypertension among older adults attending the Padalarang Community Health Center in West Bandung Regency, with individuals experiencing moderate to severe anxiety showing a higher likelihood of elevated blood pressure than those with lower anxiety levels (Amanda et al., 2024).

Several mechanisms may explain this association. Persistent anxiety activates the sympathetic nervous system and the hypothalamic–pituitary–adrenal (HPA) axis, resulting in increased secretion of catecholamines and cortisol, which promote vasoconstriction, increase heart rate, and elevate blood pressure. When sustained over time, these physiological responses may contribute to the development and persistence of hypertension. In addition, chronic anxiety can adversely affect blood pressure control by reducing adherence to antihypertensive medication, impairing sleep quality, decreasing physical activity, and limiting engagement in other health-promoting behaviors (Tsao et al., 2023; Pan, Cai, Cheng, Dong, An, & Yan, 2015; Mills, Stefanescu, & He, 2020).

The present findings are further supported by evidence from a systematic review, which concluded that individuals with anxiety are more likely to develop hypertension than those without anxiety across both cross-sectional and cohort studies. The review also suggested that anxiety is not merely a consequence of hypertension but may precede its onset through neuroendocrine dysregulation and maladaptive behavioral pathways. These findings underscore the importance of recognizing anxiety as a modifiable risk factor in both the prevention and management of hypertension (Lim et al., 2021).

From a clinical perspective, these findings indicate that hypertension management in older adults should extend beyond pharmacological treatment to include routine assessment of patients' psychological well-being. Regular anxiety screening in primary healthcare settings may enable healthcare professionals to identify older adults who require psychological support at an early stage. A holistic approach that integrates health education, counseling, family support, relaxation techniques, regular physical activity, and psychosocial interventions may improve blood pressure control while simultaneously enhancing the quality of life of older adults (World Health Organization, 2025; Ministry of Health of the Republic of Indonesia, 2024).

Overall, this study provides evidence that anxiety is significantly associated with hypertension among older adults. The high prevalence of both severe anxiety and hypertension observed in this population highlights the importance of integrating physical and mental healthcare in geriatric services. Therefore, health promotion and preventive strategies should not be limited to addressing conventional physical risk factors but should also emphasize psychological well-being through family support, community empowerment, and comprehensive gerontological nursing care. Such an integrated approach has the potential to improve hypertension management and reduce the risk of hypertension-related complications among older adults.

CONCLUSION

The majority of respondents experienced severe anxiety (55.3%), and hypertension was highly prevalent among the study population. A statistically significant association was observed between anxiety levels and hypertension among older adults. These findings indicate that increasing anxiety levels are associated with a greater likelihood of hypertension. Accordingly, comprehensive hypertension management should integrate both physical and psychological care, with routine anxiety screening and appropriate psychological interventions incorporated into geriatric healthcare to optimize blood pressure control and reduce the risk of hypertension-related complications.

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