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THE RELATIONSHIP BETWEEN AGE AND DURATION OF HYPERTENSION WITH BLOOD PRESSURE CONTROL STATUS AMONG HYPERTENSIVE PATIENTS AT DATAH KOTOU COMMUNITY HEALTH CENTER

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Abstract

Hypertension is one of the most common non-communicable diseases and remains a major public health concern worldwide. Poor blood pressure control among hypertensive patients can increase the risk of cardiovascular disease, stroke, kidney disorders, and other serious complications. Several factors may influence blood pressure control, including age and duration of hypertension. Increasing age is associated with physiological changes in the cardiovascular system, while a longer duration of hypertension may affect treatment outcomes and disease management. This study aimed to determine the relationship between age and duration of hypertension with blood pressure control status among hypertensive patients at Datah Kotou Primary Health Center. A quantitative correlational study with a cross-sectional design was conducted involving 35 hypertensive patients selected through total sampling. Data were collected through interviews, medical record reviews, and blood pressure measurements and analyzed using the Chi-Square test. The results showed that 65.7% of respondents had uncontrolled blood pressure. Statistical analysis revealed a significant relationship between age and blood pressure control status ($p = 0.001$) and between duration of hypertension and blood pressure control status ($p = 0.003$). These findings indicate that age and duration of hypertension are significantly associated with blood pressure control among hypertensive patients.

Keywords: Age, Blood Pressure Control, Duration Of Hypertension, Hypertension, Public Health Center

Introduction

Hypertension is one of the major non-communicable diseases (NCDs) contributing significantly to global cardiovascular morbidity and mortality. The prevalence of hypertension among adults continues to increase due to urbanization, population aging, and lifestyle changes, making it a public health priority in many countries, including Indonesia. According to the World Health Organization (WHO), the burden of hypertension in Indonesia remains high, and blood pressure control among many patients is still far below recommended targets, making hypertension an urgent public health concern [1]. Furthermore, the increasing prevalence of hypertension is influenced by modern dietary patterns characterized by high salt and fat intake and low levels of physical activity, all of which significantly increase the risk of developing high blood pressure across various age groups.

Poor blood pressure control increases the risk of cardiovascular events such as stroke, ischemic heart disease, and chronic kidney disease, while also imposing substantial healthcare costs and reducing patients' quality of life. Recent international guidelines emphasize the importance of combining pharmacological and non-pharmacological interventions to achieve optimal blood pressure targets. However, clinical success is strongly influenced by patient-related factors, disease

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characteristics, and healthcare system performance [2]. In practice, treatment outcomes are often hindered by poor medication adherence and inadequate routine blood pressure monitoring, particularly in primary healthcare settings.

Two clinical factors frequently associated with blood pressure control status are patient age and duration of hypertension. First, age is closely related to both the prevalence and pathophysiology of hypertension. The prevalence of hypertension increases with advancing age, and vascular changes as well as age-related comorbidities, such as atherosclerosis and renal impairment, may complicate the achievement of target blood pressure levels. Therefore, age should be considered an important determinant in evaluating blood pressure control in primary care settings [3]. In older adults, reduced vascular elasticity and increased peripheral resistance make blood pressure more difficult to control compared to younger populations.

Second, the duration of hypertension also plays a crucial role. Several cohort studies and systematic reviews have shown that a longer duration of hypertension is associated with a higher risk of cardiovascular complications and may influence therapeutic responses due to persistent vascular structural changes and the accumulation of disease-related complications. Consequently, patients who have lived with hypertension for a longer period are more likely to experience poor blood pressure control. However, the relationship between hypertension duration and blood pressure control status, independent of treatment and other contributing factors, has not been consistently demonstrated across different populations, highlighting the need for local investigations [4]. In addition, a prolonged disease duration is often associated with treatment fatigue, which may reduce medication adherence and compromise blood pressure management.

Beyond age and disease duration, contemporary literature has identified several sociodemographic factors, including educational level and socioeconomic status, as well as behavioral factors such as medication adherence, smoking habits, alcohol consumption, comorbid conditions, and access to healthcare services, as important determinants of successful blood pressure control at the primary care level. Studies conducted in community health centers have shown that a combination of individual and systemic factors determines whether patients achieve recommended blood pressure targets. Therefore, investigating key clinical factors, particularly age and duration of hypertension, within the context of Community Health Centers (Puskesmas), which serve as the frontline of primary healthcare in Indonesia, is highly relevant for developing locally appropriate interventions (Idris & Hasri, 2023). Community-based approaches through Puskesmas are particularly important because they provide broad population coverage and facilitate sustainable promotive and preventive health interventions.

In Indonesia, despite the existence of national guidelines and various NCD control programs, local data regarding blood pressure control patterns among hypertensive patients attending primary healthcare facilities remain limited and vary across regions. Datah Kotou Primary Health Center, as a primary healthcare facility serving the local population, provides a representative setting to assess whether age and duration of hypertension are associated with blood pressure control status among patients receiving primary care services. Local evidence from this setting may contribute to the development of practical recommendations for healthcare professionals aimed at improving early detection, treatment strategies, and follow-up management of hypertensive patients [1]. Furthermore, the findings are expected to support evidence-based policymaking to enhance the quality of primary healthcare services, particularly in hypertension management.

Based on the above considerations, a knowledge gap remains. Although the relationship between age, duration of hypertension, and clinical outcomes has been reported in international studies, specific, contextual, and up-to-date evidence from Indonesian primary healthcare settings, particularly at Datah Kotou Primary Health Center, remains limited. Therefore, an observational study

is needed to evaluate the relationship between age and duration of hypertension and blood pressure control status among hypertensive patients at Datah Kotou Primary Health Center.

Method

This study employed a quantitative research design with a correlational analytic approach and a cross-sectional study design. This approach was selected because it allows the simultaneous assessment of relationships between independent and dependent variables at a single point in time without researcher intervention. The study was conducted in the working area of Datah Kotou Primary Health Center and targeted patients who had been diagnosed with hypertension.

The study population consisted of all hypertensive patients receiving treatment at Datah Kotou Primary Health Center. A total of 35 respondents were included in the study using a total sampling technique, whereby all members of the population who met the inclusion criteria were selected as research participants. The independent variables were age and duration of hypertension, while the dependent variable was blood pressure control status.

Data collection was carried out through direct interviews to obtain respondents' demographic and clinical characteristics, medical record reviews to verify disease history and duration of hypertension, and blood pressure measurements using standardized instruments. The collected data were subsequently categorized according to predefined operational definitions to facilitate the analysis process.

Bivariate analysis was performed to examine the relationships between the independent and dependent variables. The Chi-Square test was used because it is appropriate for assessing associations between categorical variables. A significance level of $p < 0.05$ was applied, indicating that a p-value below 0.05 represented a statistically significant relationship between the variables under investigation.

This study also adhered to research ethics principles, including informed consent, confidentiality of participant information, and the principles of beneficence and non-maleficence. Therefore, the study was expected to generate valid and reliable data while providing empirical evidence regarding the relationship between age, duration of hypertension, and blood pressure control status in a primary healthcare setting.

Results

3.1 Characteristics of Respondents

Table 1 presents the characteristics of respondents at Datah Kotou Primary Health Center. Most respondents were male (65.7%), while females accounted for 34.3% of the sample. Regarding educational level, the majority had completed only elementary school (65.7%), followed by junior high school (25.7%) and senior high school (8.6%). Based on smoking history, most respondents had no history of smoking (65.7%), whereas 34.3% reported a smoking history. In terms of medication adherence, more than half of the respondents were non-adherent to antihypertensive medication (54.3%), while 45.7% were adherent.

Table 1. Distribution of Respondent Characteristics at Datah Kotou Primary Health Center (n = 35)

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	23	65.7
Female	12	34.3
Educational Level		
Elementary School	23	65.7
Junior High School	9	25.7
Senior High School	3	8.6
Smoking History		
No	23	65.7
Yes	12	34.3
Medication Adherence		
Adherent	16	45.7
Non-adherent	19	54.3

3.2. Univariate Analysis

Table 2 presents the distribution of respondents by age category. The majority of respondents belonged to the old-old age group (75–89 years), accounting for 62.9% of the sample, while 37.1% were categorized as young-old adults (60–74 years). These findings indicate that most hypertensive patients were older adults.

Table 2. Distribution of Respondents by Age Category at Datah Kotou Primary Health Center (n = 35)

Age Category	Frequency (n)	Percentage (%)
Young Elderly (60–74 years)	13	37.1
Old Elderly (75–89 years)	22	62.9
Total	35	100

Table 3 presents the distribution of respondents according to the duration of hypertension. Most respondents had been living with hypertension for more than five years (40.0%), followed by those with a duration of less than one year (31.4%) and those with a duration of one to five years (28.6%).

Table 3. Distribution of Respondents by Duration of Hypertension at Datah Kotou Primary Health Center (n = 35)

Duration of Hypertension	Frequency (n)	Percentage (%)
< 1 Year	11	31.4
1–5 Years	10	28.6
> 5 Years	14	40.0
Total	35	100

Table 4 presents the distribution of respondents according to blood pressure control status. The results showed that the majority of respondents had uncontrolled blood pressure (65.7%), whereas only 34.3% achieved controlled blood pressure status.

Table 4. Distribution of Diabetes Awareness After Intervention (Posttest) (n=122)

Blood Pressure Control Status	Frequency (n)	Percentage (%)
Controlled	12	34.3
Uncontrolled	23	65.7
Total	**35**	**100.0**

3.3. Bivariate Analysis

Table 5 presents the relationship between duration of hypertension and blood pressure control status. The results showed a significant association between duration of hypertension and blood pressure control status (p = 0.003). Respondents who had been living with hypertension for more than five years were more likely to have uncontrolled blood pressure compared with those who had a shorter duration of hypertension.

Table 5. Relationship Between Duration of Hypertension and Blood Pressure Control Status at Datah Kotou Primary Health Center (n = 35)

Duration of Hypertension	Controlled n (%)	Uncontrolled n (%)	Total n (%)	p-value
< 1 Year	8 (72.7)	3 (27.3)	11 (100)	0.003
1–5 Years	3 (30.0)	7 (70.0)	10 (100)	
> 5 Years	1 (7.1)	13 (92.9)	14 (100)	
Total	**12 (34.3)**	**23 (65.7)**	**35 (100)**	

Table 6 presents the relationship between age and blood pressure control status. The findings revealed a significant association between age and blood pressure control status (p = 0.001). Respondents in the old-old age group (75–89 years) were more likely to have uncontrolled blood pressure compared with those in the young-old age group (60–74 years).

Table 6. Relationship Between Age and Blood Pressure Control Status at Datah Kotou Primary Health Center (n = 35)

Age Category	Controlled n (%)	Uncontrolled n (%)	Total n (%)	p-value
Young Elderly (60–74 years)	9 (69.2)	4 (30.8)	13 (100)	0.001
Old Elderly (75–89 years)	3 (13.6)	19 (86.4)	22 (100)	
Total	**12 (34.3)**	**23 (65.7)**	**35 (100)**	

Discussion

4.1 Discussion of Respondents' Characteristics

The findings presented in Table 1 indicate that hypertensive patients at Datah Kotou Primary Health Center were predominantly male (65.7%), had an elementary school education level (65.7%), had no history of smoking (65.7%), and were largely non-adherent to antihypertensive medication (54.3%). These characteristics have important implications for blood pressure control and the overall management of hypertension.

The predominance of male respondents is consistent with previous studies reporting a higher prevalence of hypertension and poorer blood pressure control among men compared with women. Global evidence suggests that men tend to exhibit poorer blood pressure management due to health-related behavioral factors, including lower medication adherence and less healthy lifestyles [6]. Furthermore, men generally demonstrate lower adherence to prescribed treatment regimens than women, which directly affects blood pressure control outcomes [7].

Regarding educational attainment, the majority of respondents had only completed elementary school. Low educational level is closely associated with limited health knowledge, including inadequate understanding of hypertension, the importance of long-term treatment, and the potential consequences of uncontrolled blood pressure. Previous studies have shown that low health literacy contributes to poor medication adherence and inadequate blood pressure control among hypertensive patients [6,8]. This situation presents a challenge for primary healthcare providers in delivering effective health education interventions.

The results also revealed that most respondents had no history of smoking. Although smoking is a well-established risk factor for cardiovascular disease, the absence of a smoking history does not necessarily guarantee optimal blood pressure control. This finding suggests that hypertension management is influenced by multiple factors, including age, duration of disease, treatment adherence, and comorbid conditions. Cohort studies have demonstrated that in long-standing hypertension, disease progression and vascular changes may exert a greater influence on blood pressure control than individual behavioral factors alone (Qi et al., 2018).

Another important finding was the high proportion of respondents who were non-adherent to antihypertensive medication (54.3%). Medication adherence is recognized as a key determinant of successful blood pressure management. Previous studies have shown that patients with poor adherence are significantly more likely to experience uncontrolled blood pressure than those who consistently follow their treatment regimen [10,11]. This issue is particularly common among patients with long-standing hypertension, who may experience treatment fatigue and develop misconceptions regarding the necessity of lifelong therapy.

Furthermore, the International Society of Hypertension Guidelines emphasize that effective hypertension control depends largely on long-term treatment adherence and sustained lifestyle modification [12]. Therefore, the low adherence observed in this study may partly explain the high prevalence of uncontrolled blood pressure among respondents. These findings are consistent with evidence from primary healthcare settings indicating that medication adherence remains one of the most important determinants of successful hypertension management [8].

4.2 Univariate Analysis

a. Age Category of Respondents

The findings presented in Table 2 indicate that the majority of hypertensive patients at Datah Kotou Primary Health Center belonged to the old elderly category (75–89 years), accounting for 62.9% of respondents, while the remaining 37.1% were categorized as young elderly adults (60–74 years). This finding suggests that most hypertensive patients were older adults who are physiologically at a higher risk of developing hypertension and experiencing difficulties in blood pressure control.

From a physiological perspective, the aging process causes various changes in the cardiovascular system, including reduced arterial elasticity, increased peripheral vascular resistance, and decreased baroreceptor sensitivity. These changes contribute to elevated systolic blood pressure and a diminished ability of the body to maintain blood pressure within normal limits. The International Society of Hypertension Guidelines identify advanced age as a major non-modifiable risk factor for hypertension and emphasize its contribution to the difficulty of achieving optimal blood pressure control among older adults [12].

The predominance of respondents in the old elderly group is consistent with global evidence showing that the prevalence of hypertension and uncontrolled blood pressure increases substantially with age. According to the World Health Organization [6], more than two-thirds of individuals aged 60 years and older have hypertension, and many fail to achieve recommended blood pressure targets. Older adults are more likely to experience persistent and complex hypertension due to physiological aging processes and the increasing burden of comorbidities.

In addition to physiological factors, older age is associated with behavioral and psychosocial factors that may influence blood pressure control. Previous studies have reported that older adults frequently experience cognitive decline, difficulties in understanding health information, and increased dependence on family members for medication management, all of which may negatively affect treatment adherence [10]. These conditions contribute to a higher risk of uncontrolled blood pressure among elderly patients.

The results of this study are also consistent with findings from previous studies conducted in Indonesia, which have shown that most hypertensive patients attending primary healthcare facilities belong to the elderly population. National analyses have demonstrated that increasing age is significantly associated with a higher prevalence of hypertension and poorer blood pressure control, particularly among individuals with additional risk factors such as low educational attainment and prolonged disease duration [13].

The predominance of older elderly respondents in this study has important implications for healthcare services at Datah Kotou Primary Health Center. Elderly patients require a more comprehensive approach to hypertension management, including regular blood pressure monitoring, simple and repetitive health education, and active family involvement in treatment supervision. Cohort studies have demonstrated that successful blood pressure control among older adults depends not only on pharmacological therapy but also on social support and continuity of healthcare services [9].

b. Duration of Hypertension Category

The findings presented in Table 3 indicate that the largest proportion of respondents at Datah Kotou Primary Health Center had been living with hypertension for more than five years (40.0%), followed by those with a duration of less than one year (31.4%) and those with a duration of one to five years (28.6%). These findings suggest that most participants in this study were patients with long-standing or chronic hypertension.

The duration of hypertension is an important factor influencing blood pressure control. Clinically, prolonged exposure to elevated blood pressure may lead to structural and functional changes in the cardiovascular system, including vascular wall thickening, increased arterial stiffness, and endothelial dysfunction. These pathological changes make blood pressure more difficult to control, even when patients receive antihypertensive treatment. Previous cohort studies have demonstrated that a longer duration of hypertension is associated with increased arterial stiffness and a higher risk of persistent hypertension [9].

The predominance of respondents with a hypertension duration of more than five years is consistent with previous evidence indicating that longer disease duration is associated with poorer blood pressure control and an increased risk of cardiovascular complications. Studies have shown that patients with long-standing hypertension often require more complex treatment regimens, including combination therapy and closer clinical monitoring, compared with those who have a shorter disease duration [8].

In addition to physiological factors, the duration of hypertension is closely related to patient behavior. Individuals who have lived with hypertension for many years may experience treatment fatigue, decreased motivation to take medications regularly, and misconceptions regarding the importance of long-term therapy. Previous studies have reported that medication adherence tends to decline as the duration of hypertension increases, which directly contributes to poor blood pressure control [10].

These findings are further supported by national reports indicating that patients with chronic hypertension are more likely to experience uncontrolled blood pressure due to inadequate adherence to routine follow-up visits and long-term treatment regimens [14]. The International Society of Hypertension Guidelines emphasize that hypertension is a chronic condition requiring lifelong management through a combination of pharmacological treatment, lifestyle modification, and continuous monitoring [12].

The high proportion of respondents with a hypertension duration exceeding five years may partially explain the elevated prevalence of uncontrolled blood pressure observed in this study. These findings highlight the need for a more comprehensive management approach for patients with chronic hypertension, focusing not only on pharmacological treatment but also on continuous health education, adherence monitoring, and family support to achieve optimal blood pressure control and reduce the risk of long-term complications.

c. Blood Pressure Control Status

The findings presented in Table 4 indicate that the majority of hypertensive patients at Datah Kotou Primary Health Center had uncontrolled blood pressure (65.7%), whereas only 34.3% achieved controlled blood pressure status. These results suggest that most patients failed to attain the recommended blood pressure targets despite receiving healthcare services at a primary healthcare facility.

The high proportion of uncontrolled blood pressure observed in this study is consistent with global reports indicating that hypertension control remains a major public health challenge, particularly in developing countries. The International Society of Hypertension Guidelines report that only a limited proportion of hypertensive patients worldwide successfully achieve recommended

blood pressure targets [12]. Similarly, the World Health Organization [6] has reported that less than half of individuals with hypertension globally have adequately controlled blood pressure.

From a physiological perspective, the poor blood pressure control observed in this study may be attributed to the predominance of older adults and the high proportion of patients with a long duration of hypertension. Aging is associated with increased arterial stiffness, reduced vascular elasticity, and diminished responsiveness to antihypertensive therapy. Previous studies have demonstrated that older adults are at a significantly higher risk of experiencing uncontrolled blood pressure compared with younger populations [8].

In addition to physiological factors, behavioral factors play a crucial role in blood pressure control. The results revealed that more than half of the respondents were non-adherent to antihypertensive medication. Medication adherence is widely recognized as one of the most important determinants of successful hypertension management. Previous research has shown that patients with poor adherence are significantly more likely to experience uncontrolled blood pressure and cardiovascular complications than those who consistently follow their prescribed treatment regimens [10].

Another contributing factor is the relatively low educational attainment of the respondents. Low educational level is often associated with limited health literacy, inadequate understanding of long-term treatment requirements, and reduced awareness of the risks associated with uncontrolled hypertension. National reports have indicated that individuals with lower educational levels tend to exhibit poorer hypertension control than those with higher levels of education [14].

The findings of this study are also consistent with cohort studies demonstrating that blood pressure becomes increasingly difficult to control among patients with long-standing hypertension due to disease progression, declining treatment adherence, and age-related physiological changes [9] These findings suggest that uncontrolled blood pressure is the result of a complex interaction among individual characteristics, disease-related factors, and healthcare system influences. Therefore, improving hypertension control requires a comprehensive approach that includes patient education, medication adherence support, regular blood pressure monitoring, and continuous follow-up within primary healthcare settings.

4.3 Bivariate Analysis

a. Relationship Between Duration of Hypertension and Blood Pressure Control Status

The findings presented in Table 5 demonstrated a significant relationship between the duration of hypertension and blood pressure control status among hypertensive patients at Datah Kotou Primary Health Center ($p = 0.003$, $p < 0.05$). The distribution of data showed that most respondents who had been diagnosed with hypertension for less than one year had controlled blood pressure. In contrast, the majority of respondents who had been living with hypertension for more than five years exhibited uncontrolled blood pressure.

Clinically, these findings may be explained by the progressive nature of hypertension. As a chronic disease, prolonged exposure to elevated blood pressure can result in structural and functional alterations of the vascular system, including increased arterial stiffness, vascular wall hypertrophy, and endothelial dysfunction. These changes contribute to increased peripheral vascular resistance, making blood pressure more difficult to control over time. Previous cohort studies have reported that a longer duration of hypertension is significantly associated with poor blood pressure control and an increased risk of cardiovascular complications [9].

The predominance of uncontrolled blood pressure among patients with a hypertension duration exceeding five years is consistent with previous evidence indicating that long-standing hypertension is associated with a greater likelihood of treatment failure. This phenomenon may be attributed to the

accumulation of vascular damage and a gradual decline in responsiveness to antihypertensive therapy over time [8].

In addition to physiological mechanisms, the duration of hypertension is closely related to behavioral factors, particularly medication adherence. Patients with long-standing hypertension often experience treatment fatigue and reduced motivation to maintain long-term therapy. Previous studies have demonstrated that medication adherence tends to decline among patients with chronic hypertension, leading directly to poor blood pressure control [10].

Conversely, respondents who had been diagnosed with hypertension for less than one year were more likely to have controlled blood pressure. This finding may be associated with a better therapeutic response and higher levels of motivation and adherence during the early stages of the disease. The International Society of Hypertension Guidelines indicate that blood pressure control is generally easier to achieve during the initial phase of hypertension before the development of target organ damage [12].

Within the context of primary healthcare services, patients with long-standing hypertension often require a more structured chronic disease management approach. Without continuous treatment evaluation and comprehensive interventions, these patients are at increased risk of persistent uncontrolled blood pressure. The Ministry of Health of the Republic of Indonesia has also emphasized the importance of strengthening chronic disease management programs in primary healthcare settings to improve hypertension control outcomes [14].

Age may further strengthen this association, as patients with a longer duration of hypertension are commonly found among older age groups. Aging is associated with decreased vascular elasticity and increased peripheral resistance, both of which contribute to poorer blood pressure control. Previous studies have identified the combination of advanced age and prolonged hypertension duration as a strong predictor of uncontrolled blood pressure [8].

Furthermore, the relatively low educational level of respondents may have contributed to this condition. Limited health literacy may reduce patients' understanding that hypertension is a chronic disease requiring lifelong treatment and continuous management. The World Health Organization has highlighted that inadequate health literacy is associated with poor medication adherence and suboptimal hypertension control [6].

Overall, these findings suggest that the duration of hypertension plays a significant role in determining blood pressure control status. Therefore, patients with long-standing hypertension should receive comprehensive and continuous management strategies, including regular monitoring, adherence support, patient education, and family involvement, to improve blood pressure control and reduce the risk of cardiovascular complications.

b. Relationship Between Age and Blood Pressure Control Status

The findings presented in Table 6 demonstrated a significant relationship between age and blood pressure control status among hypertensive patients at Datah Kotou Primary Health Center ($p = 0.001$, $p < 0.05$). The data showed that the majority of respondents in the old-old age group (75–89 years) had uncontrolled blood pressure, whereas controlled blood pressure was more commonly observed among respondents in the young-old age group (60–74 years). These findings suggest that advancing age is associated with increasing difficulty in achieving adequate blood pressure control among hypertensive patients.

From a physiological perspective, aging is accompanied by various cardiovascular changes that contribute to elevated blood pressure and reduced treatment effectiveness. These changes include decreased vascular elasticity, increased arterial stiffness, and reduced baroreceptor sensitivity. As a result, systolic blood pressure tends to rise with age, while the body's compensatory mechanisms become less effective. The International Society of Hypertension Guidelines identify advanced age as

a major non-modifiable risk factor for hypertension and emphasize its significant contribution to uncontrolled blood pressure [12].

The present findings are consistent with global evidence indicating that the prevalence of uncontrolled hypertension increases among older adults. According to the World Health Organization [6], a substantial proportion of individuals aged 60 years and older are affected by hypertension, and blood pressure control rates in this population remain relatively low compared with younger age groups. Older adults are more likely to experience persistent hypertension due to vascular aging and reduced responsiveness to antihypertensive treatment [8].

In addition to physiological factors, advanced age is associated with a greater risk of comorbid conditions, including diabetes mellitus, chronic kidney disease, and other cardiovascular disorders. These comorbidities may exacerbate hypertension and complicate blood pressure management. Cohort studies have shown that older patients with comorbid conditions are at a significantly higher risk of uncontrolled blood pressure than those without additional chronic diseases [9].

Behavioral and psychosocial factors also play an important role in blood pressure control among older adults. Individuals in the old-old age group frequently experience cognitive decline, memory impairment, and increased dependence on family members for medication management. These conditions may negatively affect medication adherence and ultimately contribute to poor blood pressure control. Previous studies have reported that cognitive limitations and inadequate social support are associated with poorer hypertension control among elderly patients [10].

Conversely, a higher proportion of controlled blood pressure was observed among respondents in the young-old age group. This finding may be explained by their relatively better physiological condition and greater ability to understand and follow treatment recommendations. Younger elderly individuals generally maintain a higher level of independence in managing their health, including medication adherence and regular medical follow-up. Reports from the Ministry of Health of the Republic of Indonesia indicate that younger elderly populations tend to achieve better hypertension control compared with older age groups [14].

The interaction between age and duration of hypertension should also be considered. Most respondents in the old-old age group had been living with hypertension for a prolonged period. The combination of advanced age and long-standing hypertension may further impair vascular function and reduce the effectiveness of antihypertensive therapy. Previous studies have identified these two factors as strong predictors of uncontrolled blood pressure [8].

Furthermore, the relatively low educational attainment of respondents may have amplified the impact of age on blood pressure control. Older adults with limited health literacy may have difficulty understanding the importance of long-term treatment and disease management, increasing the risk of medication non-adherence. The World Health Organization has emphasized that inadequate health literacy is strongly associated with poor management of chronic diseases, including hypertension [6].

Overall, the findings of this study indicate that age is a significant factor associated with blood pressure control status among hypertensive patients. Therefore, hypertension management strategies for older adults should incorporate age-specific approaches, including regular monitoring, tailored health education, medication adherence support, and family involvement, to improve blood pressure control and reduce the risk of cardiovascular complications.

Conclusion

This study found that the majority of hypertensive patients at Datah Kotou Primary Health Center had uncontrolled blood pressure. Most respondents were categorized as old-old adults (75–89 years) and had been living with hypertension for more than five years. The results demonstrated significant associations between age and blood pressure control status ($p = 0.001$) as well as between duration of hypertension and blood pressure control status ($p = 0.003$). Older patients and those with a longer duration of hypertension were more likely to experience uncontrolled blood pressure compared with younger patients and those with a shorter disease duration.

These findings suggest that age-related physiological changes and the long-term progression of hypertension contribute to difficulties in achieving optimal blood pressure control. Therefore, hypertensive patients, particularly older adults and individuals with long-standing hypertension, require more comprehensive and continuous management strategies. Such strategies should include regular blood pressure monitoring, adherence support, patient-centered health education, lifestyle modification, and active family involvement. Strengthening chronic disease management programs at the primary healthcare level may improve blood pressure control and reduce the risk of hypertension-related cardiovascular complications. Furthermore, future studies with larger sample sizes and additional clinical and behavioral variables are recommended to provide a more comprehensive understanding of factors influencing blood pressure control among hypertensive patients.

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