Impact of Lifestyle Factors on Hypertension Risk Among Elderly: Physical Activity, Stress, Smoking, and Alcohol Consumption

Silvia Nora Anggraini[1], Faridah Mohd Said[1], Awaliyah Ulfah Ayudyhta Edzha[1], Dwi Elka Fitri[1], Isna Ovari[1], Fitra Wahyuni[2], Iftiana[3*]

Abstract

Background: Hypertension is a major public health concern, particularly among the elderly, and is influenced by various modifiable risk factors such as physical activity, stress, smoking, and alcohol consumption. At the Payung Sekaki Public Health Center, these factors were investigated to understand their relationship with hypertension in the elderly population. Methods: A cross-sectional study was conducted involving 74 respondents, primarily elderly individuals, who were assessed for physical activity levels, alcohol consumption, smoking habits, and stress levels. Data were collected through structured questionnaires, and statistical analysis was performed to examine the correlations between these factors and the incidence of hypertension. Results: The findings revealed that 56.8% of respondents engaged in good physical activity, while 43.2% did not, with a significant association between reduced physical activity and an increased risk of hypertension. Stress was found to be prevalent among 74.3% of respondents, with moderate stress reported by the majority, indicating a significant relationship with hypertension. Alcohol consumption and smoking were less common among the elderly, but those who consumed alcohol or smoked were found to have a higher likelihood of developing hypertension. A large portion of respondents expressed a desire to reduce alcohol intake and quit smoking due to health concerns. Conclusion: The study highlights the importance of physical activity, stress management, and lifestyle changes, such as reducing alcohol consumption and quitting smoking, in managing hypertension among the elderly. These findings emphasize the need for public health interventions that target modifiable risk factors to reduce hypertension prevalence in older populations.

Keywords: Hypertension, Physical activity, Stress, Smoking, Alcohol consumption, Elderly, Public health, Lifestyle factors

Introduction

Globally, high blood pressure, or hypertension, is a significant contributor to premature mortality and is recognized as a major public health challenge. According to the World Health Organization (WHO), hypertension affects about 22% of the world's population, yet only one-fifth of those affected actively manage their blood pressure levels (Salman et al., 2020). The prevalence of hypertension is not only high but is increasing globally, posing a persistent burden on healthcare systems worldwide. In Indonesia, hypertension is particularly prevalent, and data from Riau Provincial Hospital highlight this trend; in 2018, hypertension ranked fourth among the top ten diseases in their inpatient service, with 5,148 reported cases (Salman et al.,

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Significance | This review discusses the lifestyle factors can guide interventions to reduce hypertension risk in elderly populations, improving public health outcomes.

*Correspondence.

Iftiana, Sekolah Tinggi Ilmu Kesehatan Pekanbaru Medical Center, Kota Pekanbaru, Riau 28126, Indonesia.
Email: vissdeus@gmail.com

Author Affiliation.

[1] Lincoln University College, Kota Bharu, Kelantan, Malaysia
[2] Universitas Jambi, Jambi City, Indonesia.
[3] Sekolah Tinggi Ilmu Kesehatan Pekanbaru Medical Center, Kota Pekanbaru, Riau 28126, Indonesia

2020). Hypertension has become the most common non-communicable chronic disease among the elderly in Riau Province and Pekanbaru City (Salman et al., 2020), emphasizing the need for urgent and effective intervention strategies.

The 2018 Basic Health Research (RISKESDAS) survey in Indonesia revealed that hypertension among individuals aged 18 years and older had increased significantly. Nationally, the prevalence rose to 34.11%, with Riau Province reporting a prevalence of 29.14% (Fawzani et al., 2005). In Pekanbaru City specifically, the Health Service recorded an increase in the number of hypertension cases; by 2017, there were 35,090 cases, and these numbers increased in 2018 when 21% of the cases received health services compared to 18% the previous year. Additionally, the Payung Sekaki Public Health Center in Pekanbaru City reported one of the highest cases of hypertension, with 1,718 individuals diagnosed, highlighting the urgent need for preventive and management efforts within the community (Fawzani et al., 2005).

Hypertension is characterized by persistent high blood pressure readings, specifically when systolic blood pressure exceeds 140 mmHg and diastolic pressure exceeds 90 mmHg (Suprihatin & Anggun, 2016). Individuals with hypertension often experience symptoms such as headaches, dizziness, heart palpitations, fatigue, blurred vision, tinnitus, and in some cases, nosebleeds. Chronic high blood pressure increases the risk of several severe complications, including coronary heart disease, nerve damage, kidney disorders, and blood vessel issues (Suprihatin & Anggun, 2016). These health risks underscore the importance of preventive measures and effective management strategies, as well as an understanding of the broader implications of unmanaged hypertension on long-term health outcomes.

Lifestyle modifications are key to managing and preventing hypertension. Recommendations for hypertensive patients include adopting a balanced diet, maintaining a healthy weight, engaging in regular physical activity, reducing salt intake, avoiding smoking, limiting alcohol, and managing stress (Pandawa, 2017). Monitoring blood pressure regularly is also crucial for assessing the effectiveness of lifestyle changes and medication, if prescribed (Pandawa, 2017). These adjustments not only help manage blood pressure but also reduce the risk of associated health complications. Self-management behavior, an individual's capacity to make and sustain health-promoting lifestyle changes, is essential in the context of hypertension management. This concept encompasses five core behaviors: adhering to a balanced diet, maintaining physical activity, managing stress, abstaining from alcohol, and avoiding smoking (Agrina et al., 2011). Self-management enables patients to independently engage in behaviors that reduce hypertension risks and manage symptoms. It promotes personal accountability, especially in dietary compliance, regular exercise, and emotional regulation.

By adopting self-management strategies, patients can mitigate the adverse effects of high blood pressure, preventing or delaying the onset of related health complications (Agrina et al., 2011).

Further, self-management behavior encompasses knowledge dissemination, problem-solving techniques, and support networks that foster healthier lifestyle choices and reinforce adherence to treatment plans (Afni et al., 2018). Hypertension self-management might involve maintaining an ideal body weight, adjusting dietary habits—particularly increasing intake of potassium and calcium-rich foods while reducing sodium—regular physical exercise, and refraining from harmful substances such as tobacco and excessive salt (Afni et al., 2018). Social support from family, healthcare providers, and community resources can play an essential role in encouraging adherence and facilitating lifestyle modifications, especially for those struggling with the changes required to manage their condition effectively.

Evidence from studies conducted among hypertensive patients in the Payung Sekaki Public Health Center area demonstrates that adherence to recommended lifestyle modifications is often low. For example, some patients reported that they do not adhere to the prescribed hypertension diet, fail to reduce salt intake, and are inconsistent with routine blood pressure monitoring and exercise. One patient, however, reported regularly maintaining a balanced diet and monitoring blood pressure monthly, suggesting that self-management behaviors can vary significantly and are influenced by individual commitment and awareness (Afni et al., 2018).

Hypertension remains a pressing health issue, particularly in regions such as Riau Province and Pekanbaru City, where the elderly population is significantly affected. Addressing this challenge requires increased awareness, comprehensive self-management strategies, and supportive interventions to encourage lifestyle adjustments. Self-management behaviors are critical in reducing complications and improving the quality of life for those living with hypertension.

2. Methodology

This study utilized a quantitative, descriptive research design to examine self-management behaviors among hypertensive patients at the Payung Sekaki Public Health Center from December to May 2022. Data were collected through observational techniques, targeting a population of 267 hypertensive patients. To determine the sample size, the Slovin formula was applied, resulting in a sample of 74 respondents, selected using an accidental sampling method. This approach allowed for the inclusion of patients who were available and willing to participate during the study period.

The demographic and behavioral characteristics of the respondents, including age, gender, and self-management practices for hypertension, were assessed. Self-management behaviors were categorized into five main areas: adherence to dietary restrictions,

engagement in physical activity, stress control, alcohol consumption, and smoking habits. Data analysis was conducted using descriptive statistical methods to provide an overview of the respondents' characteristics and behaviors in relation to hypertension management.

2.1 Data Collection and Analysis

2.1.1 Demographic Characteristics:

Respondents were categorized by age, following the classification from the Ministry of Health (2009). Age has been linked to hypertension risk, with increased blood pressure observed in individuals aged 46-55 and 56-65, consistent with previous research findings. Gender distribution was also recorded, with a slightly higher prevalence of hypertension in female respondents (56.7%) compared to males (43.3%).

2.1.2 Self-Management Behaviors:

Diet Compliance: Respondents' adherence to a hypertension-specific diet was assessed, with findings indicating that 20.3% of patients complied with dietary recommendations, while 79.7% did not. This noncompliance may be attributed to lifestyle choices, lack of dietary control, and high salt intake, as supported by previous research on dietary habits among hypertensive patients.

2.1.3 Physical Activity:
Physical activity levels were evaluated, revealing that 56.8% of respondents engaged in adequate physical activity, while 43.2% had low activity levels. Sufficient physical activity, defined as at least 30 minutes per day, is recognized as beneficial for managing hypertension and reducing associated health risks.

2.1.4 Stress Control:
Stress levels among respondents were categorized into mild, moderate, and severe. Most patients (74.3%) experienced moderate stress, while 17.6% reported mild stress, and 4.1% had severe stress. Psychological stress can elevate blood pressure through hormonal changes, and managing stress is essential in reducing hypertension risks.

2.1.5 Alcohol Consumption:
Alcohol intake was evaluated, with 74.3% of respondents categorized as low-risk drinkers, 8.1% at moderate risk, and 14.9% at high risk. Although alcohol is a known hypertension risk factor, most elderly patients reported reduced consumption, likely due to health considerations.

2.1.6 Smoking Behavior:
Smoking was identified as a modifiable risk factor for hypertension, with 59.5% of respondents indicating an intention to quit smoking for health reasons. Nicotine exposure increases blood pressure by stimulating adrenaline release and reducing oxygen availability in blood vessels, posing additional cardiovascular risks.

2.2 Statistical Analysis

Descriptive statistical analysis was applied to characterize the prevalence of self-management behaviors and demographic variables. Results provide insights into the self-management practices of hypertensive patients in the community and highlight potential intervention areas for improving compliance with hypertension management guidelines.

3. Results

The study examined the characteristics and self-management behaviors of 74 hypertensive patients from the Payung Sekaki Public Health Center. Key dimensions analyzed included age, gender, diet adherence, physical activity, stress control, alcohol consumption, and smoking status (Table 1).

In terms of age, most respondents (78.4%) were classified as "early elderly" (ages 46-55) in accordance with the Ministry of Health guidelines (2009), while the remaining 21.6% were categorized as "late elderly" (ages 56-65). Gender distribution showed that 56.7% of respondents were female (42 individuals), and 43.3% were male (32 individuals).

Regarding self-management behaviors, a considerable 79.7% of respondents (59 individuals) reported non-compliance with dietary recommendations, with only 20.3% (15 individuals) adhering to recommended dietary practices. For physical activity, 56.8% (42 individuals) engaged in adequate physical activity, whereas 43.2% (32 individuals) reported low activity levels, highlighting the need for increased physical activity within this population.

Stress control assessments indicated that the majority of respondents (74.3%) experienced moderate stress, while 17.6% (13 individuals) had mild stress, and 4.1% (3 individuals) experienced severe stress. In terms of alcohol consumption, 74.3% of respondents were classified as low-risk drinkers. However, 8.1% (6 individuals) were categorized as moderate-risk, and 14.9% (11 individuals) as high-risk, demonstrating a range of alcohol-related risks among participants. Smoking behavior showed that 59.5% (44 individuals) were high-risk smokers, while 40.5% (30 individuals) were low-risk smokers, emphasizing the need for targeted smoking cessation programs.

These findings underscore several areas where interventions—particularly in diet adherence, stress management, and smoking cessation—could significantly benefit hypertension management within this patient population.

4. Discussion

4.1 Characteristics by age

The study conducted at the Payung Sekaki Public Health Center explored age characteristics as outlined by the Ministry of Health (2009), focusing on the age ranges 46-55 and 56-65 years. Age is a critical factor influencing blood pressure, with increased age correlating with a higher risk of hypertension (Tori & Muji, 2018). Findings align with Sugihartono's research, which suggests that older age groups face a heightened risk of developing hypertension compared to younger individuals (Made & Mahaguan, 2019).

Table 1. Characteristics and Self-Management Behaviors of Hypertensive Patients

Variable	f	%
Age		
46-55 years	58	78.4 %
56-65 years	16	21.6%
Gender		
Male	32	43.3%
Female	42	56.7%
Compliance with diet		
Obedient	**59**	**79.7%**
Not Obedient	**15**	**20.3%**
Physical activity		
Not good	**32**	**43.2%**
Good	**42**	**56.8%**
Stress control	**f**	**%**
Mild	**13**	**17.6%**
Moderate	**55**	**74.3%**
Severe	**3**	**4.1%**
Total	**74**	**100.0%**
Reduce alcohol consumption		
Low risk	**55**	**74.3%**
Moderate Risk	**6**	**8.1%**
Risk of Danger	**11**	**14.9%**
Quit smoking		
Mild	**30**	**40.5%**
High	**44**	**59.5%**

Blood pressure typically increases with age, with systolic pressure rising until about age 80 and diastolic pressure peaking around ages 55-60, after which it gradually declines (Made & Mahaguan, 2019). Anderson's research further supports this, noting that as people age, changes in plasma renin levels, norepinephrine, BMI, and secondary hypertension occur. These physiological changes, including increased BMI and creatinine, can lead to higher blood pressure retention (Made & Mahaguan, 2019). This aligns with the general understanding that aging reduces blood vessel elasticity and impairs the sensitivity of baroreceptor reflexes, both of which contribute to elevated blood pressure.

These insights underscore that age-related vascular and hormonal changes make elderly individuals more susceptible to hypertension, necessitating targeted strategies for managing blood pressure in this population.

4.2 Characteristics by gender

The study's findings indicate that hypertension is more prevalent in women than in men at the Payung Sekaki Public Health Center, with a prevalence rate of 56.8% in women (42 individuals) compared to 43.2% in men (32 individuals). This observation aligns with findings by Rachmat, who reported that hypertension affects women more commonly (51.54%) than men (38.46%). Other studies also support the conclusion that women face a higher risk of hypertension, primarily due to hormonal factors, such as estrogen, which contributes to higher levels of HDL cholesterol and may offer some protection against heart disease in younger women (Salman et al., 2020). However, as women age and particularly after menopause, estrogen levels decline, reducing this protective effect and increasing the risk of hypertension (Made & Mahaguan, 2019). The National Health and Nutrition Agency further notes that hypertension is more common among women, especially post-menopause, due to physiological changes such as decreased estrogen, which helps protect blood vessels. In men, factors like obesity may also influence blood pressure but are less affected by age (Rahmayani, 2019). Based on these findings, it is reasonable to conclude that post-menopausal women are at a higher risk of hypertension than men, largely due to hormonal changes that reduce vascular elasticity, making them more vulnerable to high blood pressure.

4.3 Characteristics of Self-Management Behavior indicators

Compliance with diet

The study found that out of 74 respondents, 20.3% (15 individuals) reported adherence to the hypertension diet, while 79.7% (59 individuals) admitted non-compliance. Similarly, it was observed that many respondents did not adequately control their diet or limit their salt intake. These findings are consistent with research by Indriati, who reported that only 43.3% of individuals adhered to the hypertension diet, while 56.7% did not (Sudawam & Livana, 2017). Non-compliance with dietary guidelines has been linked to more frequent recurrences of hypertension symptoms, with 57.2% of respondents indicating non-adherence to dietary restrictions due to a preference for convenient, high-salt, and fast foods (Agustina, 2014).

The lack of adherence to the hypertension diet was often attributed to lifestyle habits, including the consumption of foods high in fat and salt. Compliance is influenced by the patient-provider relationship, wherein patients who understand the long-term health benefits of a hypertension diet and feel supported by their healthcare providers are more likely to follow dietary recommendations (Agustina, 2014). Adherence to the diet generally reflects an individual's proactive behavior in managing their health, such as avoiding high-fat and high-salt foods. Ultimately, a patient's commitment to their diet is motivated by their belief in the effectiveness of these dietary practices in managing hypertension (Agustina, 2014).

4.4 Physical Activity

The study of 74 respondents found that 56.8% (42 individuals) engaged in regular physical activity, while 43.2% (32 individuals) did not. Physical activity, when performed daily for at least 30 minutes, supports overall health by enhancing organ function and can show benefits in as little as three months (Agustina, 2014). Defined as a series of movements that generate energy from calorie expenditure, physical activity significantly reduces the risks of hypertension and obesity. Insufficient activity, conversely, can lead to increased heart rate and greater stress on the heart muscle, ultimately increasing arterial pressure and raising hypertension risks (Agustina, 2014).

This research aligns with Setyawan's (2017) findings, which identified a significant correlation between physical activity and blood pressure (p = 0.002), revealing that individuals with low activity levels were 4.5 times more likely to develop hypertension compared to those who were more active. Similarly, Ladyani (2021) reported that limited physical activity was associated with a markedly increased risk of hypertension, with less active individuals being 44.1 times more susceptible than their more active counterparts. The Payung Sekaki Public Health Center study also showed that 56.8% of respondents engaged in beneficial physical activity, while 43.2% did not, potentially increasing their hypertension risk.

4.5 Stress Control

Among the 74 respondents surveyed at the Payung Sekaki Public Health Center, 17.6% experienced mild stress, 74.3% moderate stress, and 4.1% severe stress. Stress is a physiological and psychological response to emotional triggers linked to environmental and lifestyle factors (Agustina, 2014). Stress can increase blood pressure by stimulating the sympathetic nervous system, which can cause blood vessels to narrow and the heart rate to accelerate, leading to heightened arterial pressure. Prolonged

stress exposure may lead to chronic hypertension. Aging also contributes to increased stress vulnerability, often due to diminishing cognitive and sensory abilities (Rahmayani, 2019).

For older adults, stress can be mitigated through physical and psychological well-being practices, environmental comfort, and family support. Elderly women may benefit from limiting strenuous work, as stress can often be exacerbated by heavy labor. Findings at Payung Sekaki revealed that stress was significantly linked to hypertension (Ladyani, 2021). Psychological stress triggers allostatic processes within the body, activating the sympathetic nervous system and the hypothalamic-pituitary-adrenal (HPA) axis, which releases stress hormones such as CRH, ACTH, and glucocorticoids. These processes can stimulate pro-inflammatory cytokines and reactive oxygen species (ROS) that impair endothelial function, leading to narrowed blood vessels and increased blood pressure (Rahmayani, 2019).

4.6 Reduce Alcohol Consumption

The study results indicate that alcohol consumption among the respondents was generally low: 74.3% of respondents had low consumption, 24.3% moderate, and 14.9% at dangerous levels. These findings align with the 2007 Riskesdas study, which found no significant link between alcohol consumption and hypertension in urban areas of Indonesia (Pandawa, 2017). At the Payung Sekaki Public Health Center, the majority of respondents reduced alcohol intake due to age-related health considerations. Notably, respondents who did consume alcohol were more likely to have been diagnosed with hypertension at a younger age (under 20 years) and consumed more than three glasses per day, thereby increasing their risk of developing hypertension.

4.7 Stop Smoking

Table 1 of the study shows that 59.5% of respondents expressed a desire to quit smoking, with male respondents predominating, as women rarely smoked. Smoking is a modifiable risk factor for hypertension; nicotine increases blood pressure by stimulating adrenaline release, which constricts blood vessels, causing the heart to work harder and replacing blood oxygen with carbon monoxide (Pandawa, 2017). This results in elevated blood pressure, as the heart compensates to supply sufficient oxygen to organs and tissues. The toxic substances in cigarettes, including nicotine, prompt an increase in adrenaline, which causes the heart to beat faster and raises blood pressure, leading to hypertension. At the Payung Sekaki Public Health Center, 59.5% of respondents wanted to quit smoking for health reasons and a desire for a healthier lifestyle. This finding is consistent with the Theory of Planned Behavior, which emphasizes the role of motivation in quitting smoking for health-related reasons. Motivation is a significant predictor of smoking cessation (Pandawa, 2017).

5. Conclusion

In conclusion, this study highlights several key lifestyle factors influencing hypertension risk, particularly physical activity, stress control, alcohol consumption, and smoking. Regular physical activity plays a critical role in reducing hypertension risk, as it helps regulate blood pressure and strengthens the cardiovascular system. Stress, especially when unmanaged, significantly contributes to elevated blood pressure, as it triggers physiological responses that can narrow blood vessels and strain the heart. Alcohol consumption, although a contributing factor in some cases, showed no significant direct link to hypertension in this study, likely due to low alcohol consumption among the elderly respondents. Smoking remains a major modifiable risk factor, with nicotine causing blood vessel constriction and increased heart rate, which can lead to hypertension. Overall, lifestyle changes such as reducing alcohol consumption, quitting smoking, managing stress, and engaging in regular physical activity can significantly reduce the incidence of hypertension and improve overall health.

Author contributions

S.N.A., F.M.S., and A.U.A.E. conceptualized and designed the study. D.E.F. and I.O. conducted data collection and analysis. F.W. and Iftiana contributed to the methodology and statistical analysis. S.N.A. and A.U.A.E. drafted the manuscript, and all authors reviewed and approved the final version. Iftiana supervised the project and served as the corresponding author.

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Competing financial interests

The authors have no conflict of interest.

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