



## Factors Associated with an Increased Incidence of Complications in Patients with Hypertension

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### Abstract

**Introduction:** Hypertension is a major global health problem and a leading cause of cardiovascular morbidity and premature mortality worldwide. The prevalence of hypertension continues to increase and is frequently associated with serious complications such as heart failure, stroke, kidney damage, and visual impairment. Several factors, including age, physical inactivity, and smoking habits, contribute to the development of hypertension-related complications. Understanding these associated factors is essential to strengthen preventive and promotive strategies in managing hypertension complications.

**Objective:** Hypertension or high blood pressure is a serious medical condition that significantly increases the risk of heart disease, stroke, kidney disorders, and visual impairments. Data from 2024 show an increase in complications, with 70 cases related to heart failure and stroke, and 17 cases involving kidney damage and vision loss.

**Method:** This study aims to identify the factors associated with the increased incidence of complications in hypertensive patients at Sejian Setason Regional Public Hospital, West Bangka, in 2025. This research employs a quantitative method with a correlational analytic design and a cross-sectional approach, where independent and dependent variables are measured at a single point in time.

**Result:** The results indicate a significant relationship between age, physical activity, and smoking habits with the occurrence of complications in hypertensive patients. Older individuals have a higher risk of hypertension-related complications. Additionally, a lack of physical activity and smoking habits further increase this risk.

**Conclusion:** Based on these findings, preventive efforts are recommended through health lifestyle education and regular screening for high-risk groups. Further research is needed to evaluate the long-term effects of these factors on the progression of hypertension complications.

**Keywords:** complications, hypertension, risk factors

## Introduction

Hypertension, or high blood pressure, is a serious medical condition that significantly increases the risk of heart, brain, kidney, and other diseases. It is a leading cause of heart attack, heart failure, stroke, collectively known as cardiovascular disease (CVD), and chronic kidney damage. Controlling hypertension is essential to prevent lifelong complications and acute cardiovascular events. Hypertension is known to be the leading cause of premature death from cardiovascular disease (World Health Organization, 2024).

Hypertension is defined as a systolic blood pressure (SBP)  $\geq 140$  mmHg or a diastolic blood pressure (DBP)  $\geq 90$  mmHg. Many factors contribute to increased blood pressure with age; however, the main risk factors are related to lifestyle, such as a poor diet high in sodium and low in potassium, overweight and obesity, alcohol consumption, tobacco use, and physical inactivity (World Health Organization, 2024).

The World Health Organization (WHO) Global Report on Hypertension 2023 estimates that the number of adults with hypertension has nearly doubled globally over the past three decades, from 650 million in 1990 to 1.3 billion adults in 2019. The health impact of the rising trend of high blood pressure results in 10.8 million avoidable deaths annually and 235 million years of life lost or lived with disability. Globally, nearly 1 in 3 adults suffers from hypertension, with the prevalence slightly higher in men than women under the age of 50. Above the age of 50, the prevalence reaches nearly 49%, or 1 in 2 people, with a nearly equal prevalence among men and women.

Based on data from the 2018 Basic Health Research (Riskesdas), the prevalence of hypertension in the Bangka Belitung Islands increased by 1.58% from 8.32% in 2013 to 9.9%, with a total of 3,605 sufferers in 2018. No data on complications is known. Hypertension, or high blood pressure, is the leading cause of death worldwide, with essential hypertension accounting for 90-95% of cases. In Indonesia, according to the 2023 Indonesian Health Survey (SKI) and the 2011-2021 non-communicable disease (NCD) cohort study, hypertension is the fourth leading risk factor for death, accounting for 10.2%. The 2023 SKI data shows that 59.1% of disabilities (sight, hearing, walking) in the population aged 15 years and over are acquired diseases, of which 53.5% are non-communicable diseases, primarily hypertension (22.2%). The prevalence of hypertension based on measurement results is the prevalence of hypertension based on the average results of systolic blood pressure measurements  $\geq 140$  mmHg and/or diastolic blood pressure  $\geq 90$  mmHg.

According to the 2023 Indonesian Health Survey prevalence data, cases of hypertension based on diagnosis in the Indonesian population of all ages were 877,531 people in all provinces (Indonesian Health Survey, Ministry of Health, 2023). Judging from the Health Profile of the Bangka-Belitung Islands Province, in the last 3 years, hypertension sufferers who received health services have not been optimal, where in 2021 there were 218,500 sufferers and increased in 2022 to 308,210 sufferers, from the estimated number of hypertension sufferers aged  $>15$  years increasing again to 319,154 people in 2023, the 2023 Health Profile who received health services was 247,944 people (77.68%) and there is no known data on complications in hypertension sufferers (Health Profile of the Bangka-Belitung Islands Province, 2021-2023).

Based on data obtained from the West Bangka Health Office, the number of cases has increased year after year. In 2021, there were 42,316 cases, a further increase in 2022 to 43,555, and a further spike in the following year to 47,910. The number of cases decreased to 49,749 in 2024. There are no known complications in hypertension patients (West Bangka Regency Health Profile, 2021-2024).

Data obtained from Sejiran Setason Regional Hospital, West Bangka, showed that the number of hypertension cases recorded in 2022 was 257. This number increased to 274 in 2023. Meanwhile, in 2024 the number of hypertension sufferers decreased to 317 people, while the data on complications in hypertension sufferers were mostly in heart failure and stroke sufferers, amounting to 48 people and kidney and vision damage as many as 10 people in 2022, in the following year it increased to 60 people experiencing stroke and heart failure complications, kidney and vision damage as many as 14 people, in 2024 the number of complication cases increased again to 70 people in cases of heart failure and stroke and 17 people, while the data on complications in hypertension sufferers is mostly in heart failure and stroke sufferers, amounting to 48 people and kidney and vision damage as many as 10 people in 2022, in the following year it increased to 60 people experiencing stroke and heart failure complications, kidney and vision damage as many as 14 people, in 2024 the cases of complications increased again as many as 70 people in cases of heart failure and stroke and 17 people in kidney and vision damage. Factors contributing to complications include age, physical activity, and smoking habits. Therefore, promotional and preventive efforts need to be enhanced by controlling risk factors through education using easily understood media as a preventative measure for hypertension in the Sejiran Setason Regional General Hospital, West Bangka, in 2025.

The cause of hypertension is closely related to genetic factors, such as age, which is one factor that influences blood pressure. Age is associated with high blood pressure (hypertension). The older a person is, the greater the risk of developing hypertension (Hamzah, Khasanah, & Norviatin, 2019). Liao's (2017) study found that the increased risk of hypertension in the elderly is related to a decrease in atrial longitudinal systolic strain, which loses its flexibility and becomes stiffer. Therefore, blood with each heartbeat is forced through narrower blood vessels than usual, causing blood pressure to rise. Caraball's (2021) study of 3.3 million respondents from 31 provinces in China found that age is positively associated with increased blood pressure, with an average increase of  $0.639 + 0.001$  mmHg/year. Research (Penuela & Penuela, 2015) showed a positive and significant relationship between age and increased blood pressure, but with a divergence.

According to Trinyanto in his 2018 book entitled *Nursing Services for Hypertension Patients*, he explained that physical activity significantly affects blood pressure stability. People who are physically inactive tend to have a higher heart rate. This causes the heart muscle to work harder with each contraction. The harder the heart muscle works to pump blood, the greater the blood pressure exerted on the artery walls, resulting in increased peripheral resistance, which causes blood pressure to rise. Physical inactivity can also increase the risk of being overweight, which in turn increases the risk of hypertension.

The two main risk factors for atherosclerosis coronary heart disease, acute myocardial infarction, and sudden death are caused by smoking and high blood pressure. Smoking kills 5.4 million people each year. According to numerous studies, smoking causes direct effects such as increased blood pressure and increased heart rate, triggered by activation of the sympathetic nervous system and increased levels of the chemicals norepinephrine and adrenaline. Several studies have also shown that smoking causes endothelial dysfunction, plaque development, blood vessel damage, and increased blood pressure as a result of increased inflammatory chemicals caused by smoking (Gumus, 2018).

Based on a survey conducted at Sejiran Setason Regional Hospital, West Bangka, researchers are interested in conducting research on: Factors Associated with the Increased

Incidence of Complications in Hypertension Patients at Sejiran Setason Regional Hospital, West Bangka in 2025.

### **Objective**

Identifying Factors Associated with the Increased Incidence of Complications in Hypertension Patients at Sejiran Setason Regional Hospital, West Bangka in 2025.

### **Method**

This study employed a quantitative research design with an analytic correlational approach using a cross-sectional design. The study was conducted in 2025 at Sejiran Setason Regional Public Hospital, West Bangka. The cross-sectional approach was chosen to examine the relationship between several independent variables and the occurrence of complications in hypertensive patients by measuring all variables simultaneously at a single point in time.

The study population consisted of all patients diagnosed with hypertension who received treatment at Sejiran Setason Regional Public Hospital. The research sample was selected using a purposive sampling technique based on predetermined inclusion and exclusion criteria. Inclusion criteria included patients diagnosed with hypertension, aged 15 years and above, willing to participate in the study, and having complete medical records. Patients with incomplete data or those who were unable to communicate effectively were excluded from the study.

The independent variables in this study were age, physical activity, and smoking habits, while the dependent variable was the incidence of hypertension-related complications, including heart failure, stroke, kidney damage, and visual impairment. Data were collected using structured questionnaires and secondary data obtained from medical records to identify patient characteristics, lifestyle factors, and documented complications.

Data analysis was carried out using statistical software. Univariate analysis was performed to describe the distribution of respondent characteristics and study variables. Bivariate analysis was conducted using the Chi-square test to examine the relationship between each independent variable and the incidence of hypertension complications. The strength of the associations was expressed using odds ratios (ORs) with 95% confidence intervals, and statistical significance was determined at a p-value < 0.05. Ethical principles were strictly applied throughout the research process, including obtaining approval from the relevant ethics committee, ensuring voluntary participation, maintaining confidentiality, and protecting respondents' anonymity.

## Results

Table 1. Relationship between age and the increased incidence of hypertension in patients with hypertension with complications

Variables	Hypertension Complications						P value	POR 95%
	Not Complications		Complications		Total			
	N	%	N	%	N	%		
<b>Age</b>								
Not at Risk	9	69.23	4	30.77	13	100.0	0.001	5.625 (0.293-3.161)
At Risk	8	28.57	20	71.23	28	100.0		
<b>Physical Activity</b>								
Good	9	60.00	6	40.00	15	100.0	0.003	3.375 (0.114-2.544)
Poor	8	30.77	18	69.23	26	100.0		
<b>Smoking Habits</b>								
Non-Smokers	14	60.87	9	39.13	23	100.0	0.001	7.78 (0.556-3.546)
Smokers	3	16.67	15	83.33	18	100.0		

The table 1 shows that 9 respondents (69.23%) in the non-risk age group did not experience hypertension complications, while a higher proportion of complications was found among respondents in the risk age group, with 20 individuals (71.23%) experiencing complications. The results of the Chi-square test showed a p-value of 0.001, which is lower than the significance level of 0.05 ( $p < 0.05$ ), indicating a statistically significant relationship between age and hypertension complications. The odds ratio (OR) value of 5.625 indicates that respondents in the risk age group had a 5.6 times higher risk of developing hypertension complications compared to those in the non-risk age group.

Furthermore, the table indicates that 9 respondents (60%) with good physical activity did not experience hypertension complications, whereas hypertension complications were more frequently observed among respondents with poor physical activity. The Chi-square test results showed a p-value of 0.003 ( $p < 0.05$ ), indicating a significant relationship between physical activity and hypertension complications. The OR value of 3.375 suggests that respondents with poor physical activity had a 3.3 times higher risk of developing hypertension complications compared to those with good physical activity.

In addition, the table shows that 14 respondents (60.87%) who did not experience hypertension complications were non-smokers, while a higher proportion of complications was found among respondents with smoking habits. Among smokers, 39.13% experienced hypertension complications, which was higher compared to non-smokers. The Chi-square test yielded a p-value of 0.001 ( $p < 0.05$ ), indicating a statistically significant relationship between smoking habits and hypertension complications. The odds ratio (OR) value of 7.78 indicates that smokers had a 7.7 times greater risk of developing hypertension complications compared to non-smokers.

## Discussion

Based on the results of this study, the non-risk category, which did not experience complications, was 9 more than those who experienced complications (8). Meanwhile, the non-risk category with complications was 4 fewer than those who experienced risks (20). The results of this bivariate analysis showed that the majority of respondents provided good

family support ( $p\text{-value} = 0.001 > \alpha (0.05)$ ), indicating a relationship between age and hypertension complications at Sejiran Regional General Hospital in 2025.

The results of a study conducted by Tryanto analyzed that with increasing age, the cardiovascular system in the body will experience a decline, which will result in an increase in the incidence of hypertension. This analysis aligns with the theory put forward by (2014 in Tindangen et al., 2020), which states that age is a major factor influencing hypertension, this is due to natural changes in the body's heart, blood vessels, and hormones. Age is associated with endothelial dysfunction and increased arterial stiffness in hypertension, particularly systolic hypertension in older adults (Ekarini et al., 2020).

According to the researchers, the results of this study provide a deeper understanding of how age plays a significant role in increasing the risk of hypertension, particularly in patients who have already experienced complications. Based on the data obtained, it appears that with increasing age, the risk of hypertension not only increases but also tends to be accompanied by serious complications such as kidney failure, stroke, or heart disease. Hospitals, as healthcare institutions, also play a crucial role in conducting routine screenings and ongoing education so that patients rely not only on medication but also on lifestyle changes as a preventative measure.

The results of this study provide a deeper understanding of the importance of physical activity in managing hypertension, particularly in patients who have already experienced complications. The results show that low levels of physical activity are strongly correlated with increased blood pressure, which can ultimately worsen the condition of hypertensive patients and lead to further complications such as stroke, heart failure, or kidney disorders. Regular and measured physical activity is a crucial component of non-pharmacological therapy that often receives less attention from both patients and healthcare professionals. Hospitals play a crucial role in providing education and support to patients regarding the importance of maintaining physical fitness according to their individual medical conditions.

Through this study, researchers gained a broader understanding of how smoking significantly contributes to high blood pressure, particularly in hypertensive patients with existing complications. The results showed that smoking is not only a major risk factor for hypertension but also worsens the patient's condition and increases the potential for serious complications, such as stroke, heart attack, and long-term organ damage.

This study confirms that smoking is a lifestyle factor that directly impacts blood pressure stability and cardiovascular health. If not stopped or controlled, this habit will continue to hinder hypertension management efforts, even if the patient is already undergoing medical treatment. This study highlights the importance of educational and preventive approaches in hospitals, particularly in raising patient awareness of the dangers of smoking.

## **Conclusion**

There is a significant relationship between age, physical activity, and smoking habits with the increased incidence of complications among hypertension patients at Sejiran Setason Regional General Hospital, West Bangka, in 2025.

## **Acknowledgment**

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### **Authors' Contribution**

All authors contributed equally to every stage of the research, from proposal preparation, data collection, and analysis, to the writing of the article. All authors have read and approved the final manuscript and are responsible for the content and originality of this work.

### **Conflict of Interest**

The researchers declare that there is no conflict of interest regarding the implementation or publication of this research. The entire research process was carried out independently, without any influence from any party. Respondent participation was voluntary, with informed consent obtained, and their confidentiality and privacy were protected in accordance with ethical research standards. The researchers hope that the results of this study can serve as a valid reference for the development of nursing education and mental health support.

### **Ethical Considerations**

This research received ethical approval from the nursing education institution and the hospital where the clinical practice was conducted. All respondents were informed about the purpose and benefits of the study and signed an informed consent form. The research was conducted with a strong commitment to ethical principles, including data confidentiality and the right to voluntary participation.

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