



## Factors Related to the Incidence of Hypertension in the Elderly

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### ABSTRACT

The elderly will experience many physical and mental changes that can affect the incidence of hypertension. However, the results of several studies were different regarding what factors can affect elderly hypertension, so this can be used as a reference for further research. This study aims to determine what factors can influence the incidence of hypertension in the elderly at Panti Jompo Sabar Hati Banyuwangi. This study used a cross-sectional design with 84 elderly people at the Panti Jompo Sabar Hati Banyuwangi, Indonesia. The samples were collected using a total sampling technique. The tools used in this study were characteristic distribution instruments consisting of age, gender, family history, and lifestyle questionnaires consisting of histories of smoking and physical activity. The data analysis used was the chi-square test and multiple logistic regression tests. The Chi-Square test results showed no relationship between physical activity (p 0.418 and OR 1.600) and age (p 0.772 and OR 1.292) with the incidence of hypertension in the elderly. The results of the Chi-Square test also showed that there was a significant relationship between gender (p 0.028 and OR 0.309), family history of hypertension (p 0.018 and OR 3.316), and history of smoking (p 0.045 and OR 3.061) with the incidence of elderly hypertension. In conclusion, there is a relationship between gender, family history, and smoking history with the incidence of hypertension in the elderly. However, there is no relationship between age and physical activity with the incidence of hypertension in the elderly.

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### ABSTRAK

Lansia akan banyak mengalami berbagai perubahan pada fisik dan mental yang dapat berpengaruh terhadap kejadian hipertensi. Namun, hasil beberapa penelitian didapatkan berbeda terkait faktor apa saja yang dapat mempengaruhi hipertensi lansia sehingga hal ini dapat dijadikan acuan untuk penelitian lebih lanjut. Penelitian ini bertujuan untuk mengetahui faktor apa saja yang dapat mempengaruhi kejadian hipertensi pada lansia di Panti Jompo Sabar Hati Banyuwangi. Penelitian ini menggunakan studi potong lintang dengan jumlah sampel 84 lansia di Panti Jompo Sabar Hati Banyuwangi, Indonesia. Sampel diambil dengan pendekatan teknik total sampling. Alat yang digunakan pada penelitian yaitu instrumen distribusi karakteristik terdiri dari usia, jenis kelamin, riwayat keluarga dan kuisioner gaya hidup yang terdiri dari riwayat merokok dan aktivitas fisik. Analisis data yang digunakan menggunakan uji chi-square dan uji regresi logistik berganda. Hasil uji Chi Square diperoleh tidak terdapat hubungan aktivitas fisik (p 0,418 dan OR 1,600) dan usia (p 0,772 dan OR 1,292) dengan kejadian hipertensi pada lansia. Hasil uji Chi Square juga menunjukkan terdapat hubungan yang signifikan jenis kelamin (p 0,028 dan OR 0,309), riwayat keluarga hipertensi (p 0,018 dan OR 3,316), dan riwayat merokok (p 0,045 dan OR 3,061) dengan kejadian hipertensi lansia. Kesimpulannya terdapat hubungan jenis kelamin, riwayat keluarga dan riwayat merokok pada kejadian hipertensi lansia. Namun, tidak terdapat hubungan usia dan aktivitas fisik dengan kejadian hipertensi lansia.

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## INTRODUCTION

In 2021, the global prevalence of hypertension is 1.28 million among those aged 30-79 years of the total global population. (World Health Organization, 2021). In the European Union, there were 27.3 million people aged 80 years and over in 2016 suffering from hypertension (Benetos et al., 2019). In Shanghai, the prevalence of hypertension was 41.9% among individuals aged 34-74 years, and the prevalence was 59.4% among those aged 60 and older (Yang et al., 2017). The prevalence of hypertension sufferers in Indonesia is higher in the age groups of 55-64 years (55.2%), 65-74 years (63.2%), and > 75 years (69.5%) (Kementerian Kesehatan RI, 2018).

The increase in the incidence of hypertension in the elderly in general is due to the state of vulnerability of blood circulation due to aging factors, but it can also be caused by stress and a significant decrease in physiological function (Clegg et al., 2013; Tapolyai et al., 2020). Factors that cause hypertension can be categorized into modifiable and non-modifiable factors (Desai, 2020). Modifiable factors include an unhealthy diet (excessive salt consumption, a diet high in saturated and trans fats, low fruit and vegetable intake), physical inactivity, tobacco and alcohol use, and being overweight or obese (Batool et al., 2018). Nonmodifiable risk factors include a family history of hypertension, age over 60, gender, and co-morbidities such as diabetes or kidney disease (Ibekwe, 2015; Olack et al., 2015).

However, the results of several studies were different regarding the factors associated with the incidence of hypertension in the elderly. Risk factors such as physical activity, smoking, age, family history of hypertension, and gender are said to be research controversies because there are different findings from the results of several studies. Therefore, this should be a concern for health workers in identifying the most dominant factors that trigger elderly hypertension so that they can provide optimal management (Butarbutar et al., 2021; Situngkir et al., 2019; Sukmaningtyas & Utami, 2020; Turana et al., 2021).

Uncontrolled hypertension can cause myocardial infarction, coronary heart disease, congestive heart failure, stroke, hypertensive encephalopathy, chronic renal failure, and hypertensive retinopathy (Benetos et al., 2019; Smeltzer, 2017). Hypertension that is not handled properly can also cause a hypertensive crisis where blood pressure is > 180/110 mmHg which can cause various organ failures and increase the risk of death (Alley & Schick, 2022)

Several factors that may be related to the incidence of hypertension in the elderly are still controversial to date, so in-depth research is needed in order to provide an overview for nurses to provide holistic care and obtain optimal results by considering related factors. This is very important because it can be applied to prevent further complications so as to prevent a decrease in the quality of life in patients. The aim of this study was to determine the factors associated with the incidence of hypertension in the elderly at Posyandu Sabar Hati Banyuwangi

## METHOD

### *Study design and participants*

The research was conducted to study the factors associated with the incidence of hypertension in the elderly using a cross-sectional method. The dependent variable in

this study was the incidence of elderly hypertension while the independent factors were gender, age, genetics, physical activity and smoking. The study was carried out from August to September 2022 at the Posyandu Sabar Hati Banyuwangi, Indonesia. Inclusion criteria in this study were elderly aged > 55 years, elderly who actively participated in elderly posyandu activities. Exclusion criteria in this study were patients who were in an emergency condition and withdrew from the research process.

### *Sampling procedures*

Samples were taken using a total sampling technique, namely all elderly people who were registered and actively participated in the activities of the Posyandu for the Elderly Sabar Hati Banyuwangi, totaling 84 based on the criteria. Total sampling was utilized due to the limited population number, dropout risk, and patients failing to fulfill study requirements.

### *Data collection*

The first instrument to obtain the distribution of characteristics consisting of age, sex, genetics was obtained by the researcher from the client's health records and asked directly to the respondent and family. An instrument to determine lifestyle factors that influence the incidence of hypertension in the elderly which includes smoking habits and physical activity that is asked of patients and their families

### *Procedure*

Submission for respondents' willingness (informed) is accomplished by communicating the benefits and objectives of the research while maintaining a distance between researchers and potential respondents. Prospective respondents who have agreed to become respondents then sign an informed consent, which is used as a consent form. Provide a questionnaire for data retrieval on patient completeness. The researcher also conducted a documentation study based on the patient's health records in order to retrieve the desired data and validate it with the patient's family or respondent.

### *Data analysis*

SPSS for Windows is used to find research results. Univariate analysis (table 1) to identify the characteristic distribution of a research variable consisting of the distribution of frequency data and proportions for categorical data from gender, age, genetics, physical activity, and smoking. The purpose of bivariate analysis (table 2) is to identify the relationship between dependent and independent variables by analyzing the relationships between variables as performed by researchers. Bivariate analysis uses the Chi Square test because it uses a 2x2 categorical data scale table.

## RESULTS

The distribution of respondents (table 1) was dominated by hypertension as many as 52 people (61.9%) where among all respondents, 44 people (52.4%) had hypertension family genetics. The distribution of respondents was dominated by

women with a total of 49 people (58.3%) and the most age category was the elderly, totaling 42 people (50%). The distribution of respondents based on smoking history was mostly non-smokers totaling 53 people (63.1%) and most never doing physical activity totaling 48 people (57.1%).

The results of the Chi Square test in Table 2 showed that there was no relationship between physical activity ( $p$  0.418 and OR 1.600) and age ( $p$  0.772 and OR 1.292) with the incidence of hypertension in the elderly at the Panti Jompo Sabar Hati Banyuanyar. The results of the Chi Square test also showed that there was a significant relationship between gender ( $p$  0.028 and OR 0.309), genetics ( $p$  0.018 and OR 3.316), and smoking history ( $p$  0.045 and OR 3.061) with the incidence of elderly hypertension. The OR value for gender showed 0.309, where women had a tendency to develop hypertension 0.309 times higher than men. The OR value on genetics showed 3.316, where those who had a family history of hypertension had a tendency to develop hypertension 3.316 times higher than those who had no family history of hypertension. The OR value of smoking history is 3.061, indicating that smokers are three times more likely than non-smokers to develop hypertension.

**Table 1. Respondents' characteristics ( $n=84$ ).**

Variables	$n$ (%)	(%)
<b>Gender</b>		
Male	35	41,7
Female	49	58,3
<b>Age</b>		
Pre elderly	26	31,0
Elderly	42	50,0
Old age	16	19,0
<b>Genetics</b>		
Yes	44	52,4
No	40	47,5
<b>Smoking</b>		
Yes	31	39,9
No	53	63,1
<b>Physical activity</b>		
Never	48	57,1
Rarely	17	20,2
Routin	19	22,6
<b>Hypertension</b>		
Yes	52	61,9
No	32	38,1

Note:  $n$ : Frequency (%)

**Table 2. Relationship between gender, age, genetics, history of smoking, physical activity, with hypertension in the elderly**

		No hypertension		Hypertension		$p$	OR (RR)	IPK	
		$n$	%	$n$	%			Min	Max
<b>Genetic</b>	Male	8	22,9	27	77,1	0,028*	0,309 (0,661)	0,117	0,812
	Female	24	49,0	25	51,1				
<b>Age</b>	Pre elderly	11	42,3	15	57,7	0,772	1,292 (1,168)	0,502	3,323
	Elderly+old age	21	36,2	37	63,8				
<b>Genetics</b>	No	21	52,5	19	47,5	0,018*	3,316 (1,579)	1,318	8,340
	Yes	11	25,0	33	75,0				
<b>Smoking</b>	No	25	47,2	28	52,8	0,045*	3,061 (1,465)	1,126	8,320
	Yes	7	22,6	24	77,4				
<b>Physical activity</b>	Never	16	33,3	32	66,7	0,418	1,600 (1,200)	0,657	3,897
	Rarely+Routine	16	44,4	20	55,6				
<b>Total</b>		32	38,1	52	61,9				

Note: Chi-Square test

$p$ : p value

OR : Odds Ratio

RR : Relative Risk

\*Significant value 0.05 level

## DISCUSSION

The results of the Chi-Square Test found that there was a relationship between gender ( $p$  value of 0.772 and OR value of 0.389) with the incidence of hypertension in the elderly. The OR value of 0.389 indicates that women have a tendency to develop hypertension 0.309 times higher than men. The results of this study are in line with the findings of Butarbutar et al. (2021) and Yang et al. (2017), where there is a relationship between gender and the incidence of elderly hypertension with a  $p$  value ( $<0.05$ ). However, different findings were obtained by Astuti et al. (2021) and Malinti et al. (2020), where there was no relationship between gender and the incidence of hypertension in the elderly.

Hypertension is more common in men when it occurs in young adulthood. However, it affects more women after the age of 55; due to changes in the hormone estrogen after menopause, approximately 60% of hypertension sufferers are women (Bantas & Gayatri, 2019; Ibekwe, 2015). The hormone estrogen plays a protective role in preventing atherosclerosis by increasing HDL levels. Generally, this process begins to occur in women aged 45–55 years

(Harrison et al., 2021; Price & Wilson, 2013; Yang et al., 2017). Differences in research results occur because there are differences in the number of sample distributions in the study. In addition, the trigger factors for the occurrence of hypertension in women are far more numerous than in men. Menopausal women are more susceptible to hypertension as a result of disturbances in the hormone estrogen. The hormone estrogen is the culprit behind the narrowing of blood vessels that predisposes to hypertension (Kartika et al., 2019; Whelton et al., 2018)

The results of the Chi-Square test showed that there was no relationship between age ( $p$  value 0.772 and OR value 1.292) with the incidence of hypertension in the elderly. The OR value of 1.292 indicates that older age has a tendency to develop hypertension 1.292 times higher than younger age but does not have a statistically significant relationship. The results of the study are in line with the findings of Ulfa & Wahyuning (2017) and Mahwati (2014), where there is no relationship between age and the incidence of elderly hypertension with a  $p$  value ( $> 0.05$ ). However, different findings were obtained by Astuti et al. (2021) and Malinti

(2020), where there is a relationship between age and the incidence of hypertension in the elderly.

In general, as you get older, the body's physiological functions will decrease, including the kidneys, heart, and liver (Astuti et al., 2021). Changes in the elderly, such as atherosclerosis, loss of connective tissue elasticity, and decreased relaxation of vascular smooth muscle, which in turn reduces the ability to distend and stretch blood vessels (Saxena et al., 2018). As a consequence, the aorta and arteries are disrupted in accommodating the volume of blood pumped by the heart (stroke volume), resulting in a decrease in cardiac output and an increase in peripheral resistance so that there will be an increase in blood pressure (Benetos et al., 2019; Olack et al., 2015; Smeltzer, 2017). In the study, it was found that there was no relationship between age and the incidence of hypertension in the elderly, which is contrary to several related studies. This could be due to differences in sample distribution in several studies. In addition, in this study, all respondents had entered the aging phase, from pre-elderly to elderly, so that blood pressure increased with increasing age.

The results of the Chi-Square Test found that there was a genetic relationship (p value 0.018 and OR value 3.316) with the incidence of hypertension in the elderly. The OR value of 3.316 indicates that people with genetics associated with hypertension have a tendency to develop hypertension at a rate 3.316 times higher than the elderly who do not have a family history. The results of the study are in line with the findings of Amra (2018), Butarbutar et al. (2021) and Sari et al. (2019), where there is a relationship between family history and the incidence of elderly hypertension with a p value (<0.05).

Research by Situngkir et al. (2019) found in the results of the study that a history of hypertension in the family affects the risk of hypertension. Samples that have a family history of hypertension are 7.65 times more likely to suffer from hypertension compared to samples that do not have a family history of hypertension. This is related to disorders of the blood vessels, increased intracellular sodium levels, and a low ratio of potassium to sodium, which are inherited by families that have a history of high blood pressure (Fuchs & Whelton, 2020). Individuals with parents with hypertension have twice the risk of suffering from hypertension than people who do not have a family history of hypertension. In addition, 70–80% of cases of essential hypertension with a history of hypertension were found in the family (Sari et al., 2019).

The results of the Chi-Square Test found that there was a relationship between smoking history (p value 0.045 and OR value 3.061) with the incidence of hypertension in the elderly. The OR value of 3.061 indicates that the elderly who have a history of smoking have a tendency to develop hypertension 3.061 times higher than the elderly who do not have a history of smoking. The results of the study are in line with the findings of Situngkir et al. (2019) and Olack et al. (2015), where there is a relationship between smoking history and the incidence of elderly hypertension with a p value (<0.05). However, it is contrary to the findings of Astuti et al. (2021) and Ulfa & Wahyuni (2017), which found no relationship between smoking history and the incidence of hypertension in the elderly.

Research by Situngkir et al (2019) found that someone who smokes has a risk of suffering from hypertension by 2.71 times compared to non-smokers. Cigarette smoke (CO) has the ability to attract red blood cells stronger than its ability to attract oxygen, so it can reduce the capacity of red blood cells to carry oxygen to the heart and other tissues and

cause blood pressure to increase (Singh et al., 2017; Smeltzer, 2017). The nicotine contained in cigarettes will also damage the endothelial lining of the arteries, reducing the elasticity of the blood vessels, causing blood pressure to increase (Ulfa & Wahyuni, 2017). There are differences in the results of several studies due to the unequal distribution of women and men. Men are more often found consuming cigarettes than women. If in the study the distribution of men is much less then it will be in harmony with the unequal distribution of smokers and non-smokers. However, in this study the distribution of men and women was not much different so that significant research results were found. The data shows that out of 31 people who smoke, only 7 people do not have hypertension and 24 others have hypertension.

The results of the Chi-Square Test found that there was no relationship between physical activity (p value 0.418 and OR value 1.600) with the incidence of hypertension in the elderly. The OR value of 1.600 indicates that the elderly who are not active in physical activity have a tendency to develop hypertension 1.600 times higher than the elderly who are active in physical activity but do not have a statistically significant relationship. The results of the study are in line with the findings of Olack et al. (2015) and Astuti et al. (2021), where there is no relationship between physical activity and the incidence of elderly hypertension with a p value (> 0.05). However, different findings were obtained by Situngkir et al. (2019) and Ulfa & Wahyuni (2017), where there was a relationship between physical activity and the incidence of hypertension in the elderly.

In general, good and regular physical activity will train the heart muscle and peripheral resistance, which can prevent an increase in blood pressure. In addition, regular exercise can stimulate the release of dopamine, which causes euphoria and muscle relaxation, so that blood pressure does not increase. Increasing the intensity of physical activity up to 30–45 minutes per day is important as a strategy for the prevention and management of hypertension (Ulfa & Wahyuni, 2017). Situngkir et al. (2019) discovered in their study that a low physique has an effect on hypertension. In this study, there was no significant relationship between physical activity and the incidence of hypertension in the elderly. This can be caused because the majority of the elderly do not carry out routine physical activities, only a small number are active in sports. Data show that the number of elderly people who do not participate in activities is still very high. In addition, other factors that dominate are also found in the elderly, such as sleep pattern disturbances that many elderly people feel.

The implications of this research can provide an overview for health workers to identify the factors that cause hypertension in the elderly, influenced by several factors such as gender, genetics, and smoking status, so that this becomes the basis for nurses to carry out nursing care with a holistic approach by considering several factors related to the elderly with hypertension to achieve optimal health status.

## LIMITATION OF THE STUDY

The limitations of this study were that there were several elderly people who began to experience hearing loss and were unable to read and write, causing the question and answer process to be disrupted. In addition, there were several elderly people who could not speak Indonesian and used Javanese to communicate, where the researchers



themselves were not very fluent in Javanese, so they used translators during the research.

## CONCLUSIONS AND SUGGESTIONS

The research found that there was a relationship between gender, family history, smoking history, and the incidence of hypertension in the elderly. The study also found that there was no relationship between age and physical activity with the incidence of hypertension in the elderly at the Panti jompo Sabar Hati Banyuwangi. Viewed from the perspective of factors related to gender, genetics, and history of smoking, they are significantly associated with the incidence of hypertension in the elderly. This can be a reference for medical-surgical nurses or community nurses to provide quality care for the elderly by considering factors such as gender, family history, and smoking history.

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## ETHICAL CONSIDERATIONS

This study has acquired an ethical-clearance from the Ethics Committee of the Faculty of Health, University of Kusuma Husada, Surakarta with a register number of 122/UKH.L.02/EC/IX/2021

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