

Determinants of Hypertension Incidence among Middle-aged in Indonesia - A Study of Indonesian Family Life Survey 5 Data

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ABSTRACT

Background: The prevalence of hypertension in Indonesia significantly increases with ageing. Hypertension is commonly found on people at the age of 45-65 years because they tend to do not have healthy lifestyle.

Aim: To determine the factors associated with hypertension among middle-aged in Indonesia.

Method: This study used secondary data from Indonesia Family Life Survey (IFLS) 5 with cross sectional study design. The number of samples was 5401 with the inclusion criteria of respondents aged 45-59 years who had complete data on the variables studied, namely: age, gender, smoking habits, fast food consumption, physical activity and BMI. The data were then analyzed using multiple logistic regression.

Results: The results showed that age (AOR₍₅₄₋₅₄₎₋₍₄₅₋₄₉₎ = 1.36, 95% CI 1.16-1.60 p = 0.000 AOR₍₅₅₋₅₉₎₋₍₄₅₋₄₉₎ = 1.62, 95% CI 1.37-1.92 p = 0.000), women (AOR = 1.75, 95% CI 1.42-2.14 p = 0.000), smoking status (AOR_{Smoke} = 1.98, 95% CI 1.48-2.66 p = 0.000 AOR_{Not Smoke} = 1.49 95% CI 1.19-1.87 p = 0.000), and Obesity (AOR = 1.96, 95% CI 1.62-2.38 p = 0.000) have significant relationship with hypertension incidence among middle-aged in Indonesia.

Conclusion: Hypertension prevention program is urgent to carry out by the health workers from the Ministry of Health. Moreover, the delivery of information related to health promotion about the prevention of hypertension among middle-aged in the community is needed to be encouraged.

Keywords: Hypertension, IFLS, Indonesia, Middle-age

INTRODUCTION

High blood pressure or hypertension is very dangerous. This disease causes health problems and can kill the sufferer. Moreover, people who suffer from this disease are mostly unaware of the signs and symptoms of hypertension.²⁷ Mostly, people are too late to realize that they have hypertension. This makes them late to get treatment that result in decline in their life expectancy due to the decrease of their body function. Hence, hypertension is often known as a 'silent killer'.²

According to the World Health Organization (WHO) in 2013, cardiovascular disease is one of the global leading causes of death. The deaths from cardiovascular are increasing every year. One of cardiovascular diseases that cause death is hypertension. Hypertension causes nearly 9.4 million deaths annually. It also increases the risk of stroke and coronary heart disease by 24% and 12%, respectively.³ According to the Global Status Report on Noncommunicable Diseases in 2010, WHO reported that the number of people with hypertension in developed and developing countries is very different. In developing country, the number is greater than in developed countries as much as 40% and 35%, respectively. In Southeast Asia, hypertension has killed 1.5 million people annually and it is equal to 36% of the total population. In 2025, it is predicted that the number of hypertension sufferers around the world will be about 1.6 billion and 29% of the number is adult.⁴

The prevalence of hypertension in Indonesia increases with ageing. In 2018, the prevalence of hypertension in Indonesia is 34.11%. The prevalence of high blood pressure in men is lower than in women: 31.34% in men and 36.85% in women. Furthermore, the number is also different between people living in urban and rural areas. The prevalence of hypertension in rural areas

is lower than in urban area that is 33.72% and 34.43%, respectively.

Hypertension often occurs at the age of 45-65 years because, at that age, most people cannot do healthy lifestyle. They do not eat healthy foods, check their health regularly, exercise regularly, stay away from cigarettes and the smoke. A number of studies showed hypertension rarely occurs in younger age, whereas it is found in middle-aged and elderly groups. Middle-aged is the period from 45 to 59 years old, while elderly is from 60 years old or over.^{6,7,8}

Based on the research conducted by Framingham, it was found that blood pressure over 140/90 mmHg was experienced by 27% of people under the age of 60 years, while blood pressure over 160/100 mmHg was experienced by 20% of people under the age of 60 years. Furthermore, hypertension of more than 140/90 mmHg is experienced by 75% of elderly people over 80 years old, while hypertension of more than 160/100 mmHg is experienced by 60% of elderly people over 80 years old. On the other hand, only 7% of people over 80 years old that have normal blood pressure.¹⁴

The prevalence of hypertension in Indonesia in the age group of 45-64 has increased every year. In 2013, the prevalence of hypertension in Indonesia in that group was 40.75% and now it increases to 50.275%.^{28,29} Hypertension is caused by internal and external factors. Some factors included in external factors are smoking, salt consumption, saturated fat consumption, alcoholic beverages, obesity, lack of physical activity, stress, and estrogen use. On the other hand, some factors included in internal factors are age, sex, family medical history.¹ This study was aimed to determine the factors associated with hypertension among middle-aged in Indonesia.

RESEARCH METHOD

This study used cross sectional design. The data used was secondary data taken from the Indonesia Family Life Survey (IFLS) 5. The data from IFLS was taken from 13 out of 27 provinces in Indonesia. The population in this study were all residents recorded in Indonesia Family Life Survey (IFLS) 5 from the 13 provinces as many as 34,262 people. The sampling technique applied was multistage random sampling technique. In the first stage, the sample was taken from 34,262 people aged 45-59 years that are free from missing data so that the number of sample decreased to 6,692 people. After that, from 6,692 samples, they were selected again according to the criteria of gender, blood pressure, smoking habit, physical activity, body mass index, fast food consumption and data free from missing. In this stage, the total samples left were as many as 5401 people. The inclusion criteria in this study are people aged 45-59 years, have complete data related to gender, blood pressure, smoking habit, physical activity, body mass index, fast food consumption and data free from missing.

The measurement of hypertension variable was done by taking blood pressure measurement using Omron digital sphygmomanometer which was carried out 3 times by the trained staff. The result of the measurement was then averaged and then used for the analysis of this study. A person is said to be hypertensive if the systolic blood pressure is 140 mmHg and the diastolic blood pressure is more than 90 mmHg after was being tested twice or more at different visits in sitting position.²² Blood pressure is said to be normal if the systolic range is <120 mmHg, while the diastolic range is <80 mmHg. A person is said to have hypertension if he/she meets one from two categories of hypertension, namely if the systolic blood pressure is 140-159 mmHg and the diastolic blood pressure is 90-99 mmHg which is a level 1 hypertension, whereas if the systolic blood pressure is ≥ 160 mmHg and the diastolic blood pressure is ≥ 100 mmHg or known as level 2 hypertension.²

The measurement of Body Mass Index (BMI) can be done by measuring the body weight (kg) divided by height (m^2). Shorr measuring board is used to measure height and Seca digital scale is used to measure weight. A person is said to be obese if the body mass index is ≥ 30 kg/m^2 .²³ Physical activity was measured using the International Physical Activity Questionnaire (IPAQ) scoring. The scoring is divided into 3 categories, namely low, moderate, and high physical activity. Someone is said to have low physical activity if the IPAQ score is less than 600. To be categorized to have moderate or high physical activity, the score should be 600-2900 and 3000 or more, respectively.²⁴ The measurement of physical activity was done by counting the activities carried out by the respondents in IFLS 5 questionnaire (low, medium or high physical activity category), how long and how often the activity carried out by the respondent for one week counted in units (hours). After that, the result was calculated according to IPAQ scoring: the result of low

physical activity category is multiplied by 3.3, the result of moderate physical activity is multiplied by 4, and the result of high physical activity is multiplied by 8. Finally, the result will be categorized whether the respondent physical activity is low, moderate, or high.

In this study the respondents were grouped based on the gender, male and female. While for fast food consumption variable, they were divided into two groups: those who consume fast food and those who do not consume fast food. Moreover, for smoking habit variable, the researchers grouped them into three categories namely smoker (still smoke until now), former smoker (used to smoke but now has stopped smoking), and not smoker (never smoke at all).

The Bivariate data analysis used chi square to identify the relationship of each independent variable with the dependent variables. On the other hand, the multivariate data analysis used multiple logistic regressions.

RESULT

There are 5401 respondents who have met the criteria for the analysis. The results showed that the hypertension incidence among middle-aged was 21.64%. In this study, the age group that most affected by hypertension were people aged 55-59 years (25.82%), hypertension was more common in women (28.10%). The number of respondents who never smoked and were exposed to hypertension was 26.51%, while those who once smokers and suffered from hypertension was 23.71%, and active smoker who suffered from hypertension was 12.58%. Most respondents who were affected by hypertension had low physical activity (26.09%). Obese respondents were more likely to have hypertension (36.77%). The number of respondents who suffer from hypertension have the habit of consuming fast food (23.92%). See Table 1.

From Table 1, it can be concluded that age, sex, smoking habit, physical activity and body mass index significantly influenced hypertension incidence among middle-aged in Indonesia (p value $< \alpha$).

Furthermore, Table 2 shows the determinants of hypertension status among middle-aged (45-59 years old). The result showed that the older the people, the more prone they are to hypertension. From Table 2, it can be seen that people aged 55-59 years are 1.62 times have the risk of suffering from hypertension compared to people aged 45-49 years ($AOR_{(54-54)-(45-49)} = 1.36$, 95% CI 1.16-1.60 $p = 0.000$). Female respondents had 1.75 times risk to have hypertension compared to men ($AOR = 1.75$, 95% CI 1.42-2.14 $p = 0.000$). Former smoker have 1.98 times risk to have hypertension compared to people who are active smokers ($AOR_{Former\ Smoker} = 1.98$, 95% CI 1.48-2.66 $p = 0.000$). Respondents with obesity have 1.96 times risk to have hypertension compared to respondents who are not obese ($AOR = 1.96$, 95% CI 1.62-2.38 $p = 0.000$).

Table 1: Characteristics of Respondents among Middle-aged in Indonesia Who Have and Do Not Have Hypertension

Variable	Hypertension		No Hypertension		p value
	n	%	N	%	
Age					
45-49 years old	386	17.79	1784	82.21	0.000
50-54 years old	423	23.03	1414	76.97	
55-59 years old	360	25.82	1034	74.18	
Gender					
Male	371	14.49	2190	85.51	0.000
Female	798	28.10	2042	71.90	
Smoking Habit					
Smoker	229	12.58	1591	87.42	0.000
Former Smoker	78	23.71	251	76.29	
Not Smoker	862	26.51	2390	73.49	
Physical Activity					
Low	281	26.09	796	73.91	0.000
Moderate	484	22.82	1637	77.18	
High	404	18.34	1799	81.66	
BMI					
Obesed	207	36.77	356	80.12	0.000
Not Obesed	962	19.88	3876	63.23	
Fast Food Consumption					
Yes	83	23.92	264	76.08	0.287
No	1086	21.49	3968	78.51	

Table 2: Determinants of Hypertension Incidence among Middle-aged in Indonesia

Variable	Univariate		Multivariate	
	OR	95% CI Lower Upper	AOR	95% CI Lower Upper
Age				
45-49 years old	Ref		Ref	
50-54 years old	1.38	1.18 – 1.61	1.36	1.16 – 1.60
55-59 years old	1.60	1.36 – 1.89	1.62	1.37 – 1.92
Gender				
Male	Ref		Ref	
Female	2.30	2.01 – 2.64	1.75	1.42 – 2.14
Smoking Habit				
Smoker	Ref		Ref	
Former Smoker	2.15	1.61 – 2.88	1.98	1.48 – 2.66
Not Smoker	2.50	2.13 – 2.93	1.49	1.19 – 1.87
Physical Activity				
Low	Ref		Ref	
Moderate	0.83	0.70 – 0.99	0.86	0.72 – 1.02
High	0.63	0.53 – 0.75	0.75	0.63 – 0.90
BMI				
Obesed	2.34	1.94 – 2.81	1.96	1.62 – 2.38
Not Obesed	Ref		Ref	

DISCUSSION

Many factors can affect hypertension, one of them is age. In general, people aged over 40 years are mostly prone to hypertension that their blood vessel walls experience loss of elasticity. This will cause an increase in blood pressure due to the absence of dilatation of blood vessels caused by blood that continues to pump²¹.

In this study, age variable was divided into 3, namely 45-49 years, 50-54 years, and 55-59 years. This was aimed to prove that the older the people the more they prone to hypertension. People aged 55-59 years have 1.62 times risk of having hypertension compared to those are 45-49 years old and 50-54 years old. This is in line with the research conducted by Sedayu et al (2015) which found out that the distribution of hypertensive patients increases with age. Hypertension mostly occurs in respondents aged

≥60 years and 50-59 years by 37.1% and 36.4%, respectively¹⁵. The older they are, the more they prone to hypertension. This is because with ageing, the flexibility of the large arteries disappears and stiffens and results in increased blood pressure that caused by blood vessels that are forced out through blood vessels that are narrower than usual and the person will have hypertension²⁵.

Changes in body such as heart, blood vessels, and hormones as we age cause an increased risk of hypertension.¹² This is caused by natural changes in the body that affect heart, blood vessels, and hormones. Hypertension will increase the incidence of coronary artery disease and premature death for people at the age of more than 35 years old.¹⁶ In this study, female have 1.75 times risk of having hypertension compared to men. This is in line with the study conducted by Sulastri (2012) which showed that hypertension is more common in women (79%)

compared to men (23%)¹¹. Differences between sex chromosomes in men and women cause differences in blood pressure, besides hormonal factors, so that hypertension is more common in women compared to men¹⁰.

Smoking can cause small blood vessels in lungs to absorb nicotine that is circulated to the brain. Nicotine which is absorbed will signal the adrenal glands to release adrenaline and epinephrine which can cause narrowing of blood vessels and cause heavier heart work due to higher blood pressure. Tobacco can affect the increase in blood pressure because it can narrow blood vessels. Cigarette smoke contains carbon monoxide. The carbon monoxide in cigarette replaces oxygen bonds that are found in blood. Therefore, it can cause increased blood pressure and result in more severe heart work because it forces the heart to pump oxygen into the body's tissues and other organs.

In this study, people who were former smokers have 1.98 times risk of having hypertension compared to active smokers. This is different from the study conducted by Sartik et al (2017) which found out that people who are active smokers have 1.77 times risk of having hypertension compared to people who do not smoke²⁶. The differences in the results of this study can be caused by many factors because the cause of hypertension is not only determined by one variable, namely physical activity, body mass index, fast food consumption, and so on.

19-30% of the risk of hypertension can be reduced by regular physical activity. According to JNC VII data, systolic blood pressure can be reduced by 4-9 mmHg by doing aerobic activity for at least 30 minutes per day. Regular physical activity can train the heart muscle and also can reduce peripheral resistance so that the heart muscle, under certain conditions, can get used to do hard work. Regular exercise can cause blood pressure to not increase because it will stimulate the release of endorphins (endogenous morphine) which can cause muscle relaxation²⁰.

In this study, the results showed that people who do moderate and high physical activity have a protective factor from having hypertension. This is different from the research conducted by Harahap et al (2017) which stated that people who have low physical activity have 3.095 times risk of having hypertension compared to people who have moderate and high physical activity⁹. The differences in the results of this study can be caused by many factors because the cause of hypertension is not only determined by one variable, namely physical activity, body mass index, fast food consumption, and so on.

One of the factors that influence hypertension is central obesity. Central obesity can cause more fat stored in abdominal area which can cause intracellular accumulation of free fatty acids, decreases adiponectin level, decreases intracellular free fatty acid uptake by mitochondria resulting in less oxidation. Insulin resistance can be caused by excess free fatty acids. However, hyperinsulinemia will cause sodium absorption in kidneys and narrow the blood vessels which result in hypertension¹⁹.

This research showed that obese people have 1.96 times risk of having hypertension compared to people who are not obese. This is in line with the research conducted by Amanda (2018) that showed that the prevalence of

hypertension in respondents with central obesity was 2.56 times higher than respondents without central obesity¹⁷. Excess weight that is owned by someone who is obese will require more blood in body tissues to supply food and oxygen needed by the body tissues which cause blood volume to increase. The cardiac output will also increase which cause blood pressure to increase. Excessive weight can increase insulin level in blood. The increased insulin can cause increase in blood pressure caused by sodium retention in kidneys due to the increased insulin in blood^{12,18}.

This study has a strength that the data contained in IFLS5 has had informed consent from all participants and was previously has been reviewed by the United States (RAND) through the Institutional Review Boards (IRBs) and also by Indonesia through Gajah University Mada.

However, this study also has limitations. The procedure for measuring blood pressure was done 3 times at a time. The diagnosis was done 4 weeks after the first blood pressure measurement. This can lead to bias. Smoking and physical activity variables are very likely to have bias recall because the data collection was only carried out once at a time. Thus, the researchers would not know if the respondents' habits still same or not, or whether they take regular medication so that the blood pressure can be controlled. This causes the factors studied might be statistically insignificant.

CONCLUSION

Hypertension prevention program is urgent to carry out by the health workers from the Ministry of Health. Moreover, the delivery of information related to health promotion about the prevention of hypertension among middle-aged in the community is needed to be encouraged.

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