

## Physical Activity, Obesity, Family History, and Their Associations with Hypertension among the Elderly in Aceh Singkil, Aceh

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### ABSTRACT

**Background:** Hypertension is an important global health challenge due to its high prevalence and resulting cardiovascular disease and chronic kidney disease. This study aimed to examine the associations of physical activity, obesity, family history, with hypertension among the elderly in Aceh Singkil, Aceh.

**Subjects and Method:** This was a case control study carried out in Aceh Singkil, Aceh, Indonesia. A sample of 132 elderly was selected for this study, consisting 66 elderly with hypertension and 66 elderly without hypertension. The dependent variable was hypertension. The independent variables were physical activity, obesity, and family history. Hypertension data was measured by sphygmomanometer. The other data were collected by questionnaire. The data were analyzed by a multiple logistic regression model.

**Results:** Hypertension was associated with physical inactivity (OR= 5.12; 95% CI=2.41 to 10.86;  $p<0.001$ ), obesity (OR= 3.30; 95% CI= 1.61 to 6.74;  $p<0.001$ ), and family history (OR=7.73; 95% CI=3.56 to 16.78;  $p<0.001$ ).

**Conclusion:** Physical activity, obesity, and family history, are associated with an increased risk of hypertension.

**Keywords:** physical activity, obesity, family history, hypertension

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### BACKGROUND

Hypertension caused 9.4 million deaths worldwide each year. Data from the Global Status Report on Non-communicable Diseases 2010 from the World Health Organization (WHO) states that 40% of developing economies countries have hypertension, whereas developed countries are only 35%. Africa holds the top position of hypertension sufferers by 46%. The American region is in the last position by 35%. In Southeast Asia, 36% of adults suffer from hypertension and cause the death of nearly 1.5 million people each year (World Health Organization, 2013).

Non-communicable diseases data in Basic Health Research (Riskesdas) in 2013

showed that the prevalence of hypertension in Indonesia was 25.8%, the highest in Bangka Belitung (30.9%), South Kalimantan (30.8%), East Kalimantan (29.6%) and West Java (29.4%). An increase in the prevalence of hypertension in Indonesia based on the results of interviews conducted from 7.6% in 2007 to 9.5% in 2013 (Health Research and Development Agency, 2013).

Hypertension is called “The Silent Killer” because this disease is a hidden killer and patients usually do not know that they suffer from hypertension before checking blood pressure. In general, hypertension sufferers do not experience symptoms before complications occur (Bustan, 2012).

In Indonesia, 25.8% population suffer from hypertension. If the current population of Indonesia is 252,124,458 people, there are 65,048,110 people suffering from hypertension (Ministry of Health, 2015). The elderly morbidity rate in Indonesia in 2014 was 25.05%. The provinces with the highest rates of elderly health complaints were West Nusa Tenggara (66.36%), Aceh (65.98%), Gorontalo (63.95%) and South Kalimantan (60.71%) (Central Statistics Agency, 2010).

Based on the prevalence of hypertension in Aceh in the population aged  $\geq 18$  years, it was recorded at 21.5% and hypertension is in the fourth rank among the many diseases suffered by the people in Aceh. Data on the profile of the Aceh Singkil District Health Office in 2015 showed that hypertension cases in Aceh Singkil District were 953 cases. In 2016, the data showed that the number of hypertension sufferers in the elderly was 1,102 cases, aged 55-59 years old was 34%, aged 60-69 years was 43% and aged  $> 70$  years was 23%. In the working area of Suro Health Center, Suro District, Aceh Singkil District, the number of hypertension sufferers from January-December 2016 was 16% (Aceh Singkil District Health Office, 2015).

## SUBJECTS AND METHOD

### 1. Study Design

This study was an observational analytic study using case control design. This study aimed to analyze the risk factors for the incidence of hypertension in the elderly (elderly) in the Suro Public Health Center in Suro District, Aceh Singkil District in 2017 by comparing the case group (the elderly with hypertension) with the control group (the elderly who were not hypertensive).

### 2. Population dan Sample

The population of this study were all elderly ( $\geq 60$  years old) patients with hypertension and those who were not hypertensive in the

Suro Community Health Center, Suro District, Aceh Singkil District, amounting to 818 people. The sample size in this study was 66 samples for cases and 66 samples for controls.

### 3. Study Variables

The dependent variable was hypertension. The independent variables were physical activity, obesity, and family history.

### 4. Study Variables

**Hypertension** is systolic blood pressure  $\geq 140$  mmHg and or diastolic blood pressure  $\geq 90$  mmHg which is measured using a sphygmomanometer.

**Physical activity** is the intensity of daily physical activity that is measured using the Physical Activity Level (PAL) questionnaire. Less if PAL (1.40-1.69) and enough if PAL (1.70-2.40).

**Obesity** is the result of measurement of Body Mass Index (BMI) based on the BW/-BH of the elderly

**Family history** is a history of descent that is owned and associated with hypertension, namely mother, father and indirect, namely the biological grandfather and grandmother with measurement results, yes and no.

### 5. Study Instruments

Study instrument for measuring blood pressure was using a sphygmomanometer, physical activity was measured by the International Physical Activity Questionnaire, obesity was measured using scales (Kg), and Meters (cm) to determine the Body Mass Index (BMI).

### 6. Data Analysis

Analysis of the data in this study was using multiple logistic regression tests.

## RESULTS

### 1. Sample Characteristics

The characteristics of the sample of this study are described in Table 1.

**Table 1. Characteristics of Respondents Based on Education and Employment**

<b>Sample Characteristics</b>	<b>n</b>	<b>%</b>
<b>Education</b>		
No School	14	10.61
Elementary School	20	15.15
Junior High School.	42	31.82
High School	38	28.79
College	18	13.64
<b>Employment</b>		
Retirement of Civil Servant/Military/Police	11	8.33
Housewife	44	33.33
Entrepreneurs	54	40.91
Others	23	17.42
<b>Family History of Hypertension</b>		
Yes	69	52.27
No	63	47.73
<b>Obesity</b>		
Yes	61	46.21
No	71	53.79
<b>Physical Activity</b>		
Poor	75	56.82
Adequate	57	43.18
<b>Smoking</b>		
Yes	60	45.45
No	72	54.55
<b>Fat Consumption</b>		
High	61	46.21
Adequate	71	53.79

The education status of the elderly was mostly junior high school graduates (31.82%) and the lowest was no school (10.61%). The employment of the elderly was mostly entrepreneurs (40.91%) and the least were retired civil servants/military/police (8.33%). A total of 69 (52.27%) of the elderly have a family history of hypertension. Elderly people who have less physical activity were 75 people

(56.82%). Elderly people who smoke were 60 people (45.45%). Elderly with high fat consumption was 61 (46.21%).

## **2. Simple Logistic Regression Test Results**

The relationship of family history, obesity, and physical activity with the incidence of hypertension was analyzed using the simple logistic regression and described in Table 2.

**Table 2. The Relationship of Family History, Obesity, and Physical Activity with the Occurrence of Hypertension Based on Simple Logistic Regression Test**

Variables	Hypertension		Non-hypertension		OR	95% CI	p
	n	%	n	%			
<b>Family History</b>					7.73	3.56-16.78	<0.001
Yes	50	72.5	19	27.5			
No	16	25.4	47	74.6			
<b>Obesity</b>					3.30	1.61-6.74	0.001
Yes	40	65.6	21	34.4			
No	26	36.6	45	63.4			
<b>Physical Activity</b>					5.13	2.41-10.86	<0.001
Poor	50	66.7%	25	33.3%			
Adequate	16	28.1%	41	71.9%			

The statistical test results in Table 2 showed that there was a relationship between family history and the incidence of hypertension (OR=7.73; 95% CI= 3.56 to 16.78;  $p<0.001$ ), obesity (OR= 3.30; 95%CI= 1.61 to 6.74;  $p=0.001$ ), physical activity (OR= 5.13; 95% CI= 2.41 to 10.86;  $p<0.001$ ).

### 3. Multiple Logistic Regression Test Results

The relationship of family history, obesity and physical activity with the incidence of hypertension was analyzed using the multiple logistic regression test and is described in Table 3.

**Table 3. Results of Multiple Logistic Regression Analysis of the Effects of Family History, Obesity, and Physical Activity with Hypertension**

Variables	OR	95% CI	p
Family history	6.10	2.66-13.99	<0.001
Physical activity	2.86	1.22-6.73	0.016
Obesity	2.44	1.05-5.65	0.038

The results of the multiple logistic regression test indicated that the variables which were the predictor of hypertension were family history (OR=6.10; 95% CI= 2.66 to 13.99;  $p<0.001$ ), physical activity (OR= 2.86; 95% CI= 1.22 to 6.73;  $p=0.016$ ), and obesity (OR= 2.44; 95% CI= 1.05 to 5.66;  $p=0.038$ ).

## DISCUSSION

### 1. The relationship of family history of hypertension with the incidence of hypertension

Multiple logistic regression analysis results showed that people who have a family history of hypertension have a 6.10 times greater

chance of experiencing hypertension compared to people who do not have a family history of hypertension.

The result of this study was in line with a study done by Osamor and Owumi (2011) in India which showed that there was a significant relationship between family history and the incidence of hypertension. Heredity has a major role in the incidence of hypertension. Families who have hypertension increase the risk by 2-5 times to reduce hypertension to their descendants. If one of someone's parents has hypertension, then throughout life, the child has a 25% chance of getting hyperten-

sion. If the parents have hypertension, then the possibility to get hypertension would be 60%.

Study by Vasantha and Kanniammal (2016) supported that people with a family history of hypertension were 2.61 times more likely to experience hypertension compared to people who do not have a family history of hypertension. (OR= 2.61; p= 0.002).

## **2. The relationship of obesity with the incidence of hypertension**

The analysis showed that people who were obese have a 2.44 times greater risk of experiencing hypertension compared with those who were not obese.

The result of this study was in line with the study done by Akintunde et al. (2010) which showed the same result where of 816 respondents who experienced essential hypertension, more than half (494 people) were obese where the results of the independent sample T-test analysis showed a relationship between the average BMI with hypertension. Therefore, it can be concluded that obesity is proven to be a risk factor for hypertension.

The results of this study were also in line with Yusrizal et al. (2016) which stated that there was a positive relationship between BMI and the risk of hypertension. The higher a person's BMI, the greater the chance for hypertension.

Vasantha and Kanniammal (2016) stated that obesity has an effect on the incidence of hypertension. People who have obesity were 1.83 times more likely to have hypertension compared to people who were not obese (OR= 1.83; p= 0.040).

Obesity was a major risk for essential hypertension, diabetes and other morbidity that contribute to the development of kidney disease because it mainly increased tubular reabsorption to interfere with the pressure of natriuretic (Jiang et al., 2016).

## **3. The relationship of physical activity with the incidence of hypertension**

The analysis shows that people who have less physical activity were 2.86 times more likely to have hypertension compared to people who have enough activity.

The results of this study were in line with study done by Anggara and Prayitno (2013) which showed a significant relationship between physical activity and hypertension with a p value of <0.001.

Study by Abdul-Razak (2016) in Malaysia indicated that the greatest prevalence of hypertension was people in the city due to lack of physical activity and consumption of unhealthy food.

Regular physical activity was beneficial to regulate body weight and strengthen the heart and blood vessels and prevent various diseases, especially hypertension. Then the elderly were expected to exercise regularly at least 30 minutes a day (Yogiantoro, 2009).

Regular physical activity would increase the efforts to maintain body weight and prevent an increase in excess blood pressure over time. A meta-analysis study from Kelley et al. (2003) concluded that physical activity leads to a small but not statistically significant decrease in blood pressure.

Physical inactivity is very positively related to hypertension, and many studies have shown that increased physical activity is effective in the treatment of high blood pressure in various populations (Stamler et al., 1993).

### **AUTHORS' CONTRIBUTION**

Ricca Nophia Amra designed, performed the experiments, and analysed the data. Ricca Nophia Amra wrote the manuscript in consultation with Fazidah Aguslina Siregar and Erna Mutiara.

### **CONFLICT OF INTEREST**

There was no conflict of interest in this study.

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