



# THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND BLOOD PRESSURE HYPERTENSION PATIENTS IN THE PUSKESMAS KOTA BARAT GORONTALO CITY

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Article history:	Abstract:
<p><b>Received:</b> 6<sup>th</sup> December 2022</p> <p><b>Accepted:</b> 6<sup>th</sup> January 2023</p> <p><b>Published:</b> 8<sup>th</sup> February 2023</p>	<p>Hypertension is a non-communicable disease which is a problem in Indonesia, where the prevalence of hypertension reaches 23.8% higher than other Asian countries such as Bangladesh, Korea and Thailand. Hypertension is highly influenced by many factors, including lack of physical activity. Physical activity is any bodily movement produced by skeletal muscles that requires energy expenditure. Lack of physical activity is an independent risk factor for chronic disease and overall is estimated to cause death globally. The purpose of this study was to determine the relationship between physical activity and blood pressure in hypertensive patients at the Kota Barat Health Center, Gorontalo City. The research method is an analytic survey with a cross sectional approach, consisting of the independent variable, namely physical activity, and the dependent variable, namely blood pressure in hypertension sufferers. The population in this study were all hypertension sufferers registered at the West City Health Center in 2020. Determination of the sample in this study used the Slovin formula for sampling by random sampling with the sample criteria being patients diagnosed with hypertension aged &lt;45 years. The research results showed that there was a relationship between physical activity and blood pressure in hypertensive patients at the West City Health Center in Gorontalo City (<math>\chi^2</math> count = 17.812 and <math>p</math> value = 0.001).</p>

**Keywords:** Physical Activity, Hypertension.

## 1. INTRODUCTION

Hypertension is a condition in which systolic and diastolic pressures experience an increase that exceeds normal pressure limits (systolic pressure above 140 mmHg and diastolic pressure above 90 mmHg) (Murwani, 2011). Hypertension is a non-communicable disease which is a problem in Indonesia (Rahajeng and Tuminah, 2009)

World Health Organization data (2017), the prevalence of hypertension sufferers in the world reaches 22.1%, in the United States it reaches around 12.9%, Southeast Asia 25.1% and in Indonesia it reaches 23.8% where Indonesia is a country with higher prevalence of hypertension compared to other Asian countries, such as Bangladesh, Korea and Thailand (Maskanah *et al.*, 2019).

Hypertension has now become the number 3 cause of death after stroke and tuberculosis in Indonesia. The number reaches 6.7% of the death population at all ages in Indonesia. Indonesia is in an epidemiological transition phase which results in a shift in disease patterns from infectious to non-communicable diseases. The occurrence of this epidemiological transition is due to socio-economic changes in the population, the environment and changes in the structure of the population, where people have adopted and practiced an unhealthy lifestyle (Wulandari, 2019).

Based on the 2018 Riskesdas data, the prevalence of hypertension in people aged 18 years and over in Indonesia has increased from 25.8% (2013) to 34.1% (2018), in 2018 hypertension in people aged 18 years and over in Indonesia The highest prevalence of hypertension is South Kalimantan province with a percentage of 44.1% and the lowest sequence is in Papua, namely 22.2% (Kemenkes RI, 2018). The Gorontalo province is ranked 20th out of 30 provinces in Indonesia (Indonesia, 2018).

Based on data from the Gorontalo City Health Office that the number of hypertension sufferers in 2017, the number of new and old cases of hypertension sufferers in Gorontalo city was 4,160 with 46 deaths, in 2018 the number of new and old cases of hypertension sufferers was 6,695 with 70 deaths. whereas in 2019, the number of new and old cases was 6,324 with 57 deaths, so that if the total number of new and old cases was 17,179 with the number of deaths due to hypertension being 173 deaths (Dikes Kota Gorontalo, 2019).

Hypertension is strongly influenced by many factors including age, gender, heredity, obesity, lack of fiber consumption, and lack of physical activity (Purwono *et al.*, 2020). Physical activity is any body movement produced by

skeletal muscles that requires energy expenditure. Lack of physical activity is an independent risk factor for chronic disease and overall is estimated to cause death globally (Iswahyuni, 2017).

People who do not do enough physical activity and their appetite control is very unstable can result in excessive energy consumption resulting in increased appetite which in turn increases body weight and can cause obesity. If a person's weight increases, the blood volume will also increase, so that the heart's burden in pumping blood also increases. The greater the burden, the harder the work of the heart in pumping blood throughout the body so that peripheral pressure and cardiac output can increase then cause hypertension. Good and routine physical activity will train the heart muscle and peripheral pressure so that it can prevent an increase in blood pressure. Regular exercise can stimulate the release of endorphins which cause a euphoric effect and relax muscles so that blood pressure does not increase (Nabilah Ulhaq Dhiya, 2020).

Regular physical activity is beneficial in managing weight and strengthening the heart and blood vessel system. Lack of physical activity can cause a person to develop hypertension. In theory, physical activity greatly affects the stability of blood pressure. In people who are not actively doing activities tend to have a higher heart rate frequency. This causes the heart muscle to work harder with each contraction. The harder the heart muscle is in pumping blood, the greater the pressure on the arterial walls so that the peripheral resistance causes an increase in blood pressure. Lack of physical activity can also increase the risk of being overweight which will cause the risk of hypertension to increase (Harahap, Rochadi and Sarumpae, 2018).

Research conducted by (Hasanudin, Adriyani and Perwiraningtyas, 2018) in the Tlogosuryo area Tlogomas Village Lowokwaru District Malang City, the results of the analysis using the spermaman rank test and obtained a value of Sig. = 0.005 ( $\alpha \leq 0.05$ ). This means that there is a relationship between physical activity and blood pressure in people with hypertension.

Based on data from the West City Health Center for the number of cases of hypertension sufferers up to 2019 there were 456 people. Patients with hypertension who visited the West City Health Center, had pharmacological interventions in the form of administering drugs. In addition, individual counseling and group counseling regarding hypertension are carried out so that hypertension sufferers are expected to understand and apply preventive measures for hypertension. The results of interviews with two hypertension sufferers at the time of the study showed that they rarely did physical activities such as exercise, they also said that they just wanted to relax and enjoy their old age. Their activities are just sitting, watching and chatting with family or the surrounding community.

Based on the description of the background above, the researcher is interested in conducting research with the title "Relationship between Physical Activity and Blood Pressure Hypertension Patients in the Puskesmas Kota Barat Gorontalo City".

**2. MATERIALS AND METHODS**

The research design is an analytic survey with a cross sectional approach. The independent variable is physical activity, the dependent variable is blood pressure in hypertension sufferers. The population is all hypertension sufferers recorded in the working area of the West City Health Center in 2019. The total sample is 82 people using a random sampling technique that meets the inclusion and exclusion criteria.

**3. RESULTS AND DISCUSSION**

**Results**

The research was carried out in the working area of the West City Health Center from May to June 2020 with a total sample of 82 people. The research results were analyzed using univariate and bivariate analysis, which are presented as follows:

1. Characteristics of Respondents

The characteristics of respondents in the Puskesmas Kota Barat area in Gorontalo City can be seen in the table below.

**Tabel 4.1**  
**Characteristics of respondents in the Puskesmas Kota Barat area in Gorontalo City.**

Characteristics of Respondents	Frequency	
	N	%
Based On Age		
36-40 Years	17	20,7
41-45 Years	65	79,3
Based On Gender		
Male	44	53,7
Female	38	46,3
Based On Education		
SD	14	17,1
SMP	9	11,0

SMA	49	59,8
Diploma	4	4,9
Sarjana	6	7,3
Based On Work		
Laborer	6	7,3
Honorary	3	3,7
Housewife	23	28,0
Driver	12	14,6
Farmer	5	6,1
Government Employee	7	8,5
Private	11	13,4
Entrepreneur	15	18,3

Source: Primary Data

2. Univariate Analysis

a. Distribution of Respondents Based on Physical Activities in the Puskesmas Kota Barat area in Gorontalo City

**Tabel 4.2**

**Distribution of Respondents Based on Physical Activities in the Puskesmas Kota Barat Area in Gorontalo City**

Physical Activities	Frequency	
	N	%
Light Activity	22	26,8
Moderate Activity	26	31,7
Strenuous Activity	34	41,5
Total	82	100,0

Source: Primary Data

Based on the table, it can be seen that in the working area of the West City Health Center most of the respondents did strenuous physical activities as many as 34 people (41.5%).

b. Distribution of Respondents Based on Blood Pressure in the Puskesmas Kota Barat area in Gorontalo City.

**Tabel 4.3**

**Distribution of Respondents Based on Blood Pressure in the Puskesmas Kota Barat area in Gorontalo City**

Category	Frequency	
	N	%
Pre Hipertension	37	45,1
Hipertension Level 1	26	31,7
Hipertension Level 2	19	23,2
Total	82	100,0

Source: Primary Data

Based on the table, it can be seen that in the work area of the West City Health Center most of the respondents suffered from pre-hypertension as many as 37 people (45,1%).

3. Bivariate Analysis

Bivariate analysis was conducted to determine the relationship between physical activity and blood pressure in hypertensive patients at the Puskesmas Kota Barat in Gorontalo City. Analysis was performed using the chi square test. The results of the analysis are as follows:

**Tabel 4.4**

**The Relationship between Physical Activity and Blood Pressure in Hypertension Patients at the Puskesmas Kota Barat in Gorontalo City**

Physical Activity	Blood Pressure						Total	χ <sup>2</sup> Count p value	
	Pre Hipertension		Hipertension Level 1		Hipertension Level 2				
	N	%	n	%	N	%			
Light Activity	3	13,6	9	40,9	10	45,5	22	100,0	17,812 0,001
Moderate Activity	11	42,3	9	34,6	6	23,1	26	100,0	
Strenuous Activity	23	67,6	8	23,5	3	8,8	34	100,0	
Total	37	45,1	26	31,7	19	23,2	82	100,0	

Source: Primary Data

Based on the table above, it can be seen that of the 22 respondents who did light physical activity, most of them had blood pressure in the hypertension category tk. 2, namely as many as 10 people (45.5%). Of the 34 respondents who did strenuous physical activity, the majority had blood pressure in the pre-hypertension category, as many as 23 people (67.6%).

The results of the analysis using the chi square test, obtained a calculated  $\chi^2$  value of 17.812 and a  $p$  value of 0.001. By fulfilling the statistical hypothesis  $\chi^2$  count (17.812) >  $\chi^2$  table (7.779) and the value of  $p$  (0.001) <  $\alpha$  (0.05) it is interpreted that there is a relationship between physical activity and blood pressure in hypertensive at the Puskesmas Kota Barat in Gorontalo City.

## DISCUSSION

### 1. The characteristics of respondents in the Puskesmas Kota Barat area in Gorontalo City

The results of the study found that the frequency distribution of respondents in the Puskesmas Kota Barat in Gorontalo City was based on age, most were 41-45 years old, namely 65 people (79.3%). Based on gender, the majority were male, namely 44 people (53.7%). Based on education, most of them had secondary education (SMA), namely 49 people (59.8%). Based on work, the majority of as many as 59 people (72.0%) work in various fields of work.

According to the researchers, hypertension with pre hypertension, level I and level II experienced by respondents in this study was based on age characteristics, most of whom were aged 41-45 years were affected by changes in the body's ability caused by increasing age. With increasing age, there will be a decrease in the function of organs including the cardiovascular organs in the form of narrowing of blood vessels which can increase blood pressure. The arteries that carry blood from the heart to the rest of the body lose their flexibility and become stiff. Therefore, blood is forced at each heartbeat through narrower blood vessels than usual and causes an increase in blood pressure.

In line with that stated by (Novitaningtyas, 2014) that increasing age can increased blood pressure, because the walls of the arteries in the elderly (elderly) will experience thickening in a buildup of collagen in the muscle layer, so that the blood vessels will gradually narrow and become stiff. therefore blood with each heartbeat is forced to pass through narrower blood vessels than normal and causes blood pressure to rise.

Based on gender characteristics, most of them are male. The researcher's assumption because men as the head of the household have the responsibility to provide a living for the family, so they often work too hard and are prone to stress due to work demands. job characteristics the respondents in this study work in various fields of work.

Researchers argue, women the same risk of developing hypertension. in this study, there female respondents hypertension. The women, is a decrease in estrogen levels with increasing age. Estrogen levels protect blood vessels from damage, when estrogen levels decrease, blood vessels are more susceptible to damage in the form of loss of elasticity resulting in hypertension.

(Sari and Susanti, 2016) that gender is one of the factors that cannot be changed. Men have a higher level of hypertension than women but have a lower level of awareness of hypertension. The Respondents were mostly secondary education (SMA). relates to the characteristics of the population in urban areas, most of whom have middle and high education. Education related to knowledge, where the higher the level of education, will increase understanding of something. knowledge will form better behavior.

The theory put forward by Sudarma (2008) in (Dewi Lestari Ratna ningsih, 2017) that a low level of education has an impact knowledge and this affects behavior. education cannot guarantee the creation of good behavior, Lehendroff and Tracy's theory, behavior is not only influenced by ability but also will. the lower a education level, the higher risk of experiencing hypertension

### 2. Physical activity by respondents in the Puskesmas Kota Barat Gorontalo City

The results in the Puskesmas Kota Barat, the majority of respondents strenuous physical activities as many as 34 people (41.5%). Researchers assume this happens because it is related to the work. respondents on average work as farmers, laborers, civil servants, and others. They work from morning to evening and which requires them to be physically active such as walking, lifting heavy loads, hoeing, and taking care of the house for housewives. this study the activities of the respondents were classified as heavy activities.

The increase in a person's physical activity, the need for oxygen-containing blood will be even greater. This need will be met by the heart by increasing blood flow. This blood vessels widening (vasodilation) so that it will have an impact on the individual's blood pressure (Makawekes, Suling and Kallo, 2020).

This line with research conducted by (Sherly *et al.*, 2015) title the factors related to the incidence of hypertension which states that a significant relationship between physical activity and hypertension.

### 3. Respondents' blood pressure in the Puskesmas Kota Barat area, Gorontalo City.

The results of the study most of the respondents suffered from pre-hypertension as many as 37 people (45.1%). According researchers, the blood pressure of the respondents related to the physical activities by the respondents. Because the respondents jobs that required them to be physically active, they were included as people routinely and regularly physical activity.

Researchers assume who people are less active, their control appetite unstable resulting in excessive energy consumption so that appetite increases which in turn increases body weight and obesity. person's weight increases, the blood volume will also increase, that the heart's burden in pumping blood also increases. The greater the burden, the harder the work of the heart in pumping blood throughout the body so that peripheral pressure and cardiac output can increase then cause hypertension.

This line with research conducted by (Hasanudin, Adriyani and Perwiraningtyas, 2018) the found results there is a relationship between physical activity and blood pressure in people hypertension in the Tlogosuryo RT/RW 01/02 area, Tlogomas Village, Lowokwaru District, Malang City. Physical activity or exercising regularly can lower or stabilize blood pressure.

4. The Relationship between Physical Activity and Blood Pressure Hypertension patients at Puskesmas Kota Barat in Gorontalo City

The results of the analysis using the chi square test, obtained calculated  $\chi^2$  value of 17.812 and  $p$  value of 0.001. the statistical hypothesis  $\chi^2$  count (17.812) >  $\chi^2$  table (7.779) and the value of  $p$  (0.001) <  $\alpha$  (0.05) interpreted there is a relationship between physical activity and blood pressure in hypertensive patients at the Puskesmas Kota Barat in Gorontalo City.

The tabulation of the 22 respondents did light physical activity, them had category hypertension level 2, as many 10 people (45.5%). And the 34 respondents did strenuous physical activity, them had blood pressure in the pre-hypertension category, as namely 23 people (67.6%).

The conclusion that the more or heavy activities carried out can lower blood pressure in hypertensive patients, conversely the less or lighter activities carried out the blood pressure in hypertensive patients will be higher.

In theory, physical activity greatly affects the stability of blood pressure. In people who are not actively doing activities tend to have a higher heart rate frequency. This causes the heart muscle to work harder with each contraction. The harder the heart muscle is in pumping blood, the greater the pressure on the arterial walls so that the peripheral resistance causes an increase in blood pressure. Lack of physical activity can also increase the risk of being overweight which will increase the risk of hypertension (Triyanto, 2014) in (Jalal *et al.*, 2014) .

Regular physical activity helps improve the overall efficiency of the heart. Those who are physically active generally have lower blood pressure and are less likely to have high blood pressure. Those who are physically active tend to have better functioning muscles and joints, because such organs are stronger and more flexible. Activities in the form of movement or aerobic exercise are beneficial for improving and maintaining fitness, cardio-respiratory endurance. Examples of aerobic exercises are walking, jogging, swimming, cycling. Aerobic exercise makes the muscles of the body work (Hasanudin, Adriyani and Perwiraningtyas, 2018).

The results of in line with previous research conducted by (Khomarun, Nugroho and Wahyuni, 2014) in study it was found that there was a significant change in the decrease in systolic blood pressure in respondents after morning walk intervention was 40 times within 8 weeks.

#### 4. CONCLUSION

Based on the results research "The Relationship between Physical Activity and Blood Pressure in Hypertension Patients at the Puskesmas Kota Barat in Gorontalo City", it can be concluded as:

1. Patients with hypertension at Puskesmas Kota Barat in Gorontalo City have the characteristics of being mostly aged 41-45 years (79.3%), male sex (53.7%), secondary education (59.8%) and working (72.0%).
2. Most of the respondents in the Puskesmas Kota Barat in Gorontalo City, carried out strenuous physical activities 34 people (41.5%).
3. Most of the respondents in the Puskesmas Kota Barat in Gorontalo City, suffered from pre-hypertension many as 37 people (45.1%).

This a relationship between physical activity and blood pressure in hypertension sufferers at the Puskesmas Kota Barat area in Gorontalo City ( $\chi^2$  count = 17.812 and  $p$  value = 0.001).

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