



Correlation between Fat Intake and Physical Activity on The Incidence of Hypertension in Patients Aged 45 – 69 Years Old in Regional Dinoyo Health Center Malang City

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Abstract. According to 2018 Riskesdas data, the prevalence of hypertension among those ≥ 18 years old was 34.1%, in Indonesia and 36.3% in East Java. According to Malang City Health Profile 2020, the most common disease in Malang City is high blood pressure with 35,641 cases. The term "hypertension" refers to a situation when a person's blood pressure is higher than normal limits. Systolic and diastolic blood pressure measurements are used to characterize this condition performed at intervals of 5 to 10 minutes in relaxation condition. In the working place of the Dinoyo Public Health Center in Malang City, this study sought to investigate the association between dietary fat intake and physical activity and the development of hypertension in hypertensive patients. This type of research is cross-sectional and quantitative in character. Descriptive univariate analysis and bivariate analysis (Spearman's rank test) were used to assess the data. The findings of this study indicated a relationship between dietary fat intake and hypertension (p value = $0.000 < 0.05$), as well as between physical activity and hypertension (p value = $0.006 < 0.05$).

Keywords: Hypertension, Fat Intake, Physical Activity

1 Introduction

High blood pressure is a non-communicable disease (PTM) and a significant problem for world health [1]. Hypertension is also the main cause of death from non-communicable diseases. According to WHO 2021, high blood pressure causes premature death globally. This is because many hypertensive patients are not aware that they have the disease, so hypertension is referred to as the "silent killer" [2]. World Health Organization (WHO) most deaths are caused by cardiovascular disease. Indonesia is in the top rank (26.4%) among the 11 countries that make up the WHO SEAR (Southeast Asia Region). A person suffers from hypertension if their blood pressure increases above normal levels, which increases morbidity and mortality [3]. According to [4] high blood

pressure is also associated with 40% of deaths from heart disease and 51% of deaths from stroke. In addition, 57.6% of Indonesia's population suffers from hypertension, another non-communicable disease. This is shown by the increase in hypertension clinic visits every year at First Level Health Facilities (FKTP) [5].

Hypertension is a condition in which blood pressure increases above normal, namely 140/90 mmHg. Several studies state that the higher prevalence of hypertension is directly proportional to increasing age [6]. According to WHO 2015 the prevalence of hypertension in the world reached 26.4% and is estimated to increase in 2025 by 29.2% [7]. The prevalence of hypertension in women in Indonesia (36.9%) has a higher prevalence of hypertension than men (31.3%) in the age group >18 years. Hypertension is a disease that often occurs in menopausal women. Hypertension in women is higher during menopause compared to men by 41%. This is due to decreased levels of the hormone estrogen [8].

Meanwhile, the national prevalence of hypertension in 2013 was 25,8%; in 2018 it was 34,1% [9]. The number of cases of high blood pressure in Malang City in 2021 reaches 36.9% and is always listed in the 10 most diseases by the Malang City Health Office. Dinoyo Health Center is a health center in Malang City which has an increase in hypertension cases every year. In 2021 the percentage of hypertension will reach 67.6%. Cases of hypertension are included in the 15 most common diseases at the Dinoyo Health Center with being in the top 3 out of 15 diseases [10]. The prevalence of hypertension at the Dinoyo Health Center has increased every year and exceeded the prevalence of hypertension in the world (22%) and Southeast Asia (25%) [11].

If a person's systolic and diastolic blood pressure measurements measured in a calm state are greater than 140 and 90 mmHg at two different intervals for 5-10 minutes, they are considered to have hypertension [12]. Many risk factors, such as consumption of foods high in salt and fat, eating little fruits and vegetables, drinking alcohol, lack of exercise, stress, socioeconomic factors, and genetic predisposition, can lead to an increase in the number of people with hypertension [13]. Non-modifiable and modifiable risk factors that contribute to high blood pressure as a risk factor. Some of the risk factors that can be changed include genetics, age and sex which cannot be changed. Some modifiable risk factors include exercise, eating habits, sodium and fat intake, alcohol and cigarette use and stress [14].

Excessive fat consumption can increase the amount of LDL cholesterol (Low Density Lipoprotein) in the blood. This buildup in the blood vessels produces plaque, which narrows the blood vessels. This triggers high blood pressure [14]. In Indonesia, 41.7% of people consume fried foods, high cholesterol, and fatty foods at least once a day. Meanwhile in East Java Province it reached 48.5% [15].

Research conducted [16] in Surakarta City states that blood pressure, systolic and diastolic blood pressure and fat intake are correlated (p value = 0.009). According to research [17] 76% of respondents belong to the level 2 hypertension group and have high fat intake. Compared to respondents with grade 1 high blood pressure, respondents with grade 2 hypertension were found to consume excessive amounts of fat 7.51 times greater.

Less physical activity affects the elasticity of blood vessels and the cardiac system. Individuals with a low level of physical activity experience an increase in heart rate

which is also a burden for the heart to pump harder resulting in an increase in blood pressure which leads to hypertension [18]. Low physical activity at the age of ≥ 10 years reached 33.5% in Indonesia in 2018, while in East Java Province it reached 26.5% [15].

According to research findings [19] with a p value = 0.005 < 0.05 H_0 invalidates the hypothesis that physical activity is associated with high blood pressure. Research conducted using the Wilcoxon test [20] showed that there was an effect on the blood pressure results of the elderly in Taloarane Village before and after the activity ($p = 0.000$). Research [21] the more physically active a person is, the lower their blood pressure will be. Conducted in the work area of the Dinoyo Public Health Center, Malang City, the findings of this study aimed to determine the correlation between fat consumption and physical activity on the prevalence of high blood pressure in hypertensive patients aged 45-69 years.

2 Methods

A cross-sectional design and a correlational quantitative methodology were used in this study. The study participants were hypertensive patients who were in the working area of the Dinoyo Health Center in Malang City. Fat intake and physical activity are variables in this study. 264 people with hypertension aged 45-69 years in July - September are the study population. The time frame for this research is February - March 2023. The purposive sampling technique was used in selecting a sample of 80 people.

The instrument used is a systematic questionnaire with interview techniques. Using a structured questionnaire to collect data regarding name, age, gender, education, occupation, address, and results of blood pressure measurements. The International Physical Activity Questionnaire (IPAQ) provides information on physical activity and the Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ) provides information on fat intake. The standard instrument is used in all questionnaires, so it does not require validity and reliability tests. The integrity of this research has been approved by the Health Research Ethics Commission of the Faculty of Dentistry, Airlangga University with certificate number 027/HRECC.FODM/I/2023. Data analysis for this study used univariate and bivariate analysis. Spearman's rank test was used in the bivariate analysis to ensure correlation between variables, used to test the relationship between fat intake and physical activity and the prevalence of high blood pressure. To find out the characteristics of each research variable, a univariate analysis was carried out.

3 Results

The characteristics of respondents were shown in Table 1. Most of the respondents were female (80%), aged 55-64 (58.75%), had graduated from college (28.75%), and were housewife (68.75%). From the results of blood pressure measurement, it was found that there were 55 people with grade 1 hypertension (68.75%) and 25 people with high blood pressure level 2 (31.25%).

This study also revealed that 45 respondents (56.25%) were categorized as having low physical activity. Cooking, sweeping, mopping, washing dishes and taking walks around the house are some of the physical activities that were done by respondents. From fat intake measurement, 43.75% of respondents consumed too much fat.

Table 1. Characteristic and Distribution of Respondent Data (n=80)

Variable	n	%
Gender		
Male	16	20
Female	64	80
Age (years)		
45 – 54	9	11,25
55 – 64	47	58,75
65 – 69	24	30
Education		
Elementary School	19	23,75
Junior High School	16	20
Senior High School	22	27,5
College	23	28,75
Employment		
Doesn't work	2	2,5
Housewife	55	68,75
Government Employees	5	6,25
Entrepreneur	4	5
Pension	14	17,5
Hypertension		
Hypertension Stage 1	55	68,75
Hypertension Stage 2	25	31,25
Physical Activity		
Low	45	56,25
Moderate	27	33,75
Vigorous	8	10
Fat Intake		
Deficient	18	22,5
Well	27	33,75
Over	35	43,75

The findings of the Spearman's rank test showed a strong correlation between physical activity and hypertension (p value = $0.006 < 0.05$) in hypertensive patients aged 45-69 years in the working area of the Dinoyo Public Health Center, Malang City. The results of the IPAQ questionnaire interview revealed that respondents who did light exercise did it every day, including 10 minutes of walking and other light exercise.

Table 2. Correlation of Physical Activity with Hypertension

Physical Activity	Hypertension				Total		p-value
	Stage 1		Stage 2				
	n	%	n	%	N	%	
Low	33	73,3	12	26,6	45	100	0,006
Moderate	14	51,8	13	48,1	27	100	
Vigorous	4	50,0	4	50,0	8	100	

According to the Table 3, 35 respondents consumed too much fat, 33 respondents (94.2%) had grade 1 high blood pressure and 2 respondents (5.71%) had grade 2 high blood pressure. 18 samples had less fat intake, including 2 respondents (11.1%) had stage 1 hypertension and 16 respondents (88.8%) had stage 2 hypertension. In the working area of the Dinoyo Community Health Center in Malang City, the results of the Spearman Rank test showed that fat consumption in hypertensive patients aged 45-69 years have a relationship ($p\text{ value} = 0.000 < 0.05$). The results of the SQ-FFQ interviews revealed that people who consume excessive amounts of fat often consume foods such as butter, organ meats, coconut oil and coconut milk. In addition, respondents often consumed fried foods high in saturated fat, such as corn omelette, cakes, fried tempeh, fried tofu, crackers, and others. Most respondents cook with coconut milk, fry and stir-fry.

Table 3. Correlation of Fat Intake with Hypertension

Fat intake	Hypertension				Total		p-value
	Stage 1		Stage 2				
	n	%	n	%	N	%	
Deficient	2	11,1	16	88,8	18	100	0,000
Well	20	74,0	7	25,9	27	100	
Over	33	94,2	2	5,71	35	100	

4 Discussion

This study found that most of the respondents had grade 1 hypertension (68.75%). If the systolic and diastolic blood pressure are higher than 140 and 90 mmHg respectively, after two measurements taken at 5 – 10-minute intervals at rest, the high blood pressure may worsen [22]. Many of them also had low physical activity. Cooking, sweeping, mopping, washing dishes and taking walks around the house are just some of the respondents' simple physical activities. The health of the heart, lungs and other organs can be maintained by regular physical exercise that lasts at least 30 minutes every day. If you exercise regularly, you will get more benefits. If physical activity is carried out regularly every day for the next 3 months, optimal results will be obtained [23]. Based on fat intake, the majority of respondents consumed too much fat. The daily

risk of developing high blood pressure is 3.33 times higher among those who consume excess fat than those who consume moderate and low fat [24].

The findings of the Spearman's rank test showed a strong correlation between physical activity and hypertension (p value = $0.006 < 0.05$) in hypertensive patients aged 45-69 years in the working area of the Dinoyo Public Health Center, Malang City. The results of the IPAQ questionnaire interview revealed that respondents who did light exercise did it every day, including 10 minutes of walking and other light exercise. WHO recommends doing moderate intensity physical activity for 30 minutes every day [3].

According to [25] physical activity is a series of skeletal muscle movements of the body. Exercise has the potential to affect blood pressure. Heart rate is higher in individuals who are not physically active. The heart muscle then contracts more forcefully as a result. Peripheral pressure and blood pressure both increase as a result of an increase in the force of the heart muscle to pump blood. Lack of physical activity can increase the likelihood of obesity which increases the risk of high blood pressure [26].

Research findings [3] which show a correlation between physical activity and the prevalence of high blood pressure (p value = $0.001 < 0.05$) at the Kedu Health Center, Temanggung Regency confirm the conclusions of the findings of this study. Study findings [27] also show that the risk of high blood pressure decreases with increasing physical exercise. According to research findings [21] in the pre- and elderly population at Puskesmas I East Denpasar, daily physical activity and high blood pressure levels are interrelated. The participants' blood pressure decreased as the amount of physical exercise they did increase. According to a different study, those who do physical activity less than 600 MET per week are 1.25 times more likely to get hypertension than people who do physical activity more than 600 MET per week [28]. Regular aerobic exercise that is done properly for at least 30 minutes every day can keep blood pressure stable and within the normal range [29].

In the working area of the Dinoyo Community Health Center in Malang City, the results of the Spearman Rank test showed that fat consumption in hypertensive patients aged 45-69 years have a relationship (p value = $0.000 < 0.05$). The results of the SQ-FFQ interviews revealed that people who consume excessive amounts of fat often consume foods such as butter, organ meats, coconut oil and coconut milk. In addition, respondents often consumed fried foods high in saturated fat, such as corn omelette, cakes, fried tempeh, fried tofu, crackers, and others. In addition, the majority of respondents cook with coconut milk, fry and stir-fry. WHO recommends consuming fat 20-30% of a person's total energy needs. This amount supports the absorption of fat-soluble vitamins [30].

The findings of this study are in line with the findings of a study [31] which found a relationship between dietary fat consumption and the prevalence of high blood pressure (p value = $0.019 < 0.05$). The findings of this study are also consistent with research [32] which found a relationship between dietary fat intake and hypertension in hypertensive patients at the Paceda Health Center, Madidir Regency, Bitung City (p value = $0.044 < 0.05$).

Consuming foods high in saturated fat can increase LDL cholesterol and cause atherosclerosis, which causes plaque to build up in the blood arteries and increases

blood pressure [33]. Blood pressure can be lowered by consuming less saturated animal fats and more animal unsaturated fats from seeds, vegetable oils and other plant foods [34].

5 Conclusion

The results of research and analysis of data on hypertensive patients at the Dinoyo Health Center in Malang City, there is a significant correlation between physical activity and the prevalence of hypertension and a significant correlation between the consumption of dietary fat and the prevalence of high blood pressure. Therefore, the authors propose suggestions for further research using another questionnaire as a comparison and adding more detailed criteria in taking research samples.

Author's Contribution

HSAP designed the study, formulated the concept, wrote the manuscript, and collected data. SK acquired the data, revised the manuscript, performed the field work, read, and approved the final manuscript. KN formulated the concept, enrolled participants, analyzed data and revised the manuscript.

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