

Low Fiber and High Fat Intake: A Determinants of the Occurrence of High Blood Pressure in Obese Employees at Jakarta Islamic Hospital

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Keywords: Fiber, Fat, Blood Pressure, Obesity.

Abstract: Obesity can increase several degenerative diseases risk, especially high blood pressure. High blood pressure in obese can be triggered by various factors. This study aims to determine the relationship between physical activity, fiber, and fat intake with blood pressure in obese employees at Jakarta Islamic Hospital. This research is a quantitative study with a cross-sectional design using secondary data obtained from Jakarta Islamic Hospital. The data collected in this study were blood pressure from Medical Check Up (MCU), physical activity level from Global Physical Activity Questionnaire (GPAQ), also fiber and fat intake from Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ) with the number of respondents as many as 41 respondents. The results showed that most of the respondents had normal blood pressure (56.1%), low physical activity (56.1%), low fiber intake (65.9%), and excessive fat intake (58.5%). Statistical tests show that there is a relationship between fiber (p -value = 0.002) and fat intake (p -value = 0.002) with blood pressure, but there is no relationship between physical activity and blood pressure (p -value = 1,000). It is suggested to respondents be able to increase physical activity, consume enough fiber and reduce fat intake to prevent obesity which has an impact on high blood pressure.

1 INTRODUCTION

The prevalence of obesity continues to increase quite rapidly from year to year. Based on Riskesdas in 2013, the prevalence of obesity in Indonesia reached 14.8% and in 2018 it increased to 21.8% (Kemenkes RI, 2018a). The prevalence of obesity in DKI Jakarta Province was 29.8%, especially in the Central Jakarta City area, reaching the highest figure of 33.3% in 2018 (Kemenkes RI, 2018b).

Obesity is a health problem that can increase the risk of degenerative diseases, one of which is high blood pressure (WHO, 2019). The prevalence of high blood pressure (hypertension) in DKI Jakarta Province was found at 33.4% and in Central Jakarta City it reached 39.1% in 2018 (Kemenkes RI, 2018b). Obese patients have a 9 times higher risk of developing high blood pressure (Kartikasari, 2012). Obesity conditions with high blood pressure can increase the risk of heart disease which affects morbidity and mortality rates (Kemenkes RI, 2013; WHO, 2016).

High blood pressure in obese patients is a disease caused by various risk factors, including high fructose intake (Haris & Tambunan, 2016), low levels of

physical activity (Kartikasari, 2012; Rohkuswara & Syarif, 2017), low fiber intake (Kartikasari, 2012; Rohkuswara & Syarif, 2017), low fiber intake. Ramadhani et al., 2017; Rohkuswara & Syarif, 2017; Yuriah et al., 2019), high sodium intake (D. M. Sari & Panunggal, 2013), high fat intake (Ramadhani et al., 2017; Yuriah et al., 2019), as well as a person's high level of stress (Gunawan & Adriani, 2020; Suoth et al., 2014).

Based on the results of Riskesdas 2018, the prevalence of residents in Central Jakarta who lack physical activity reached 43.46%, much higher than the prevalence in Indonesia, which was only 33.5% (Kemenkes RI, 2018b). Obese patients tend to be low in activity which causes an increase in heart rate. A high heart rate will increase blood pressure (Kartikasari, 2012). According to research, someone whose physical activity is less at risk is 2 times higher for suffering from high blood pressure compared to someone whose physical activity is sufficient (Rohkuswara & Syarif, 2017).

The prevalence of residents of Central Jakarta City who consume less fruit and vegetables is very high, reaching 95.05% according to the results of Riskesdas in 2018 (Kemenkes RI, 2018b).

Consumption of vegetables and fruits that are less can describe low fiber intake. Fiber has an important role in reducing the risk of high blood pressure in obese people (Rohkuswara & Syarif, 2017). Low fiber intake will reduce bile acid excretion so that cholesterol absorption will increase and it will accumulate in blood vessels (D. M. Sari & Panunggal, 2013; N. Sari et al., 2016; Thompson et al., 2011; Yuriah et al., 2019). Lack of fruit and vegetable consumption has a 1.3 times higher risk of developing high blood pressure (Rohkuswara & Syarif, 2017).

In addition, it was also found that the prevalence of consumption of fatty foods >1 serving per day in the population of Central Jakarta City reached 42.12%, much higher than the prevalence of DKI Jakarta Province which was only 39.41% according to the results of RISKESDAS in 2018 (KEMENKES RI, 2018b). Someone who is obese tends to like fast food that contains high fat (Suoth et al., 2014). Excess fat intake plays a role in the accumulation of cholesterol which then causes plaque (atherosclerosis). One of the triggering factors for high blood pressure is a blockage in the blood vessels (Ramadhani et al., 2017; WHO, 2013; Yuriah et al., 2019). Excess fat intake was also found to be 7.51 times more in patients with grade 2 hypertension than in patients with grade 1 hypertension (Yuriah et al., 2019).

The level of physical activity, fiber, and fat intake can affect the nutritional status of the employees of Jakarta Islamic Hospital. Health workers and employees in health services must have good health status so that their performance is always optimal to continue to improve the quality of health services. Jakarta Islamic Hospital employees are a group at risk for high blood pressure with obesity because after a preliminary study, data obtained that 65.6% (292 of 445) of Jakarta Islamic Hospital employees are obese (HR RSIJ CP, 2021). In addition, based on the results of interviews with several employees of Jakarta Islamic Hospital, it is known that daily activities with a busy work schedule result in infrequent exercise. An unfavorable eating pattern was also found in the results of a 2 x 24-hour recall of food intake which showed that employees preferred fast food, which was generally low in fiber and high in fat. Low physical activity and fiber intake, as well as high fat intake, can increase the risk of developing high blood pressure in obese employees. Therefore, researchers are interested in examining the relationship between levels of physical activity, fiber, and fat intake with blood pressure in obese employees at Jakarta Islamic Hospital.

2 METHOD

This study is a quantitative study using a cross-sectional study design and Chi-Square statistical test. The population in this study were all 292 obese employees at Jakarta Islamic Hospital in October 2021. The sample size in this study was 41 samples calculated using a two-proportion hypothesis test.

This study is using purposive sampling. The inclusion criteria for this study are respondents who are willing to be the research sample and have a BMI ≥ 27 kg/m². While the exclusion criteria for this study were respondents who were on a diet, during pregnancy and had chronic diseases (chronic kidney disease and heart disease).

The dependent variable studied was blood pressure. While the independent variables studied were physical activity, fiber intake, and the proportion of fat intake.

Blood pressure is the pressure exerted by circulating blood on the arterial walls of the body as measured by nurses using a mercury sphygmomanometer. Categorized as high if systolic pressure ≥ 140 mmHg and/or diastolic ≥ 90 mmHg and normal if systolic pressure < 140 mmHg and/or diastolic < 90 mmHg (KEMENKES RI, 2013).

Physical activity is a daily activity that includes frequency and intensity which is divided into three domains (activities at work, travel, and recreation as measured by MET (metabolic equivalents) values. Obtained through a questionnaire with the Global Physical Activity Questionnaire (GPAQ) interview. Categorized as low if the MET score is < 600 and sufficient if ≥ 600 (WHO, 2012).

Fiber intake is the average daily intake of respondents from food and beverages consumed in the last 1 month. Obtained through a questionnaire with the Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ) interview. Categorized as less if the intake is < 8 grams/day and sufficient if ≥ 8 grams/day (Sunarti, 2017; PERSAGI, & AsDI, 2019).

The proportion of fat intake is the average daily intake of respondents from food and beverages consumed in the last 1 month compared to energy needs. Obtained through a questionnaire with the Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ) interview. Categorized more if $> 30\%$ and sufficient if $\leq 30\%$ of energy needs (PERSAGI, & AsDI, 2019; Kementerian Kesehatan Republik Indonesia, 2018).

All data used in this study is secondary data obtained from Jakarta Islamic Hospital in October – November 2021. Researchers were involved in the data collection process with the nutrition installation.

3 RESULTS

3.1 Respondents Characteristics

Table 1: Distribution of Respondents by Characteristics.

No	Variables	Total (n)	Percentage (%)
1	Gender		
	Man	11	26,8
	Women	30	73,2
2	BMI Classification		
	Obesity Grade I	7	17,1
	Obesity Grade II	34	82,9
3	Blood Pressure		
	High	18	43,9
	Normal	23	56,1
4	Physical Activity		
	Low (METs <600)	23	56,1
	Moderate (METs ≥600 – <3000)	16	39,0
	High (METs ≥3000)	2	4,9
5	Fiber Intake		
	Deficient (<8 grams/day)	27	65,9
	Sufficient (≥8 grams/day)	14	34,1
6	The proportion of Fat Intake		
	Excessive (>30% of energy requirement)	24	58,5
	Sufficient (≤30% of energy requirement)	17	41,5

Based on table 1, it is known that most of the respondents are female, which is 73.2%. In addition, based on BMI, it is known that most of the respondents fall into the category of obesity level II, which is 82.9% with an average BMI of 34.31 kg/m² (27-47 kg/m²). The average age of the respondents was 42.97 years with the lowest age being 29 years and the highest being 53 years.

Based on blood pressure data, some respondent's blood pressure was included in the normal category, namely 56.1% with an average systolic pressure of 131.85 mmHg (99 – 164 mmHg) and a diastolic pressure of 85.24 mmHg (69 – 108 mmHg). The level of physical activity of some respondents was included in the low category (METs <600) which was 56.1% with the average score of the respondent's physical activity METs being 761.95 (0 – 3320). The fiber intake of most of the respondents was included in the deficient category (<8 grams/day) which was 65.9% with the average fiber intake of the respondents being 7.33 grams/day (0.53 – 29.44 grams/day). The proportion of fat intake of some

respondents is included in the excessive category (>30% of the need) which is 58.5% with the average proportion of the respondent's fat intake being 34.48% of the need (4.69 - 88.39% of the need). The average proportion of respondent's fat intake is high when compared to the proportion of fat intake for balanced nutrition, which is 25-30%.

3.2 Relationship between Physical Activity and Blood Pressure

For the analysis of the relationship between physical activity and blood pressure, the category of moderate to high physical activity was categorized as sufficient. Based on table 2, it is known that in respondents with high blood pressure, as many as 10 (43.5%) respondents have low levels of physical activity and 8 (44.4%) respondents have sufficient levels of physical activity. This shows a tendency that respondents with low or moderate physical activity have the same proportion of high blood pressure. This tendency is also reinforced by the results of statistical

Table 2: Distribution of Respondents According to Physical Activity and Blood Pressure.

Physical Activity	Blood Pressure				Total		PR (95% CI)	P-value
	High		Normal		n	%		
Low	10	43,5	13	56,5	23	100,0	0,978 (0,488 – 1,961)	1,000
Sufficient	8	44,4	10	55,6	18	100,0		

Table 3: Distribution of Respondents According to Fiber Intake and Blood Pressure.

Fiber Intake	Blood Pressure				Total		PR (95% CI)	P-value
	High		Normal		n	%		
Deficient	17	63,0	10	37,0	27	100,0	8,815 (1,304 – 59,569)	0,002
Sufficient	1	7,1	13	92,9	14	100,0		

Table 4: Distribution of Respondents According to Proportion of Fat Intake and Blood Pressure.

The proportion of Fat Intake	Blood Pressure				Total		PR (95% CI)	P-value
	High		Normal		n	%		
Excessive	16	66,7	8	33,3	24	100,0	5,667 (1,495 – 21,473)	0,002
Sufficient	2	11,8	15	88,2	17	100,0		

tests which show there is no relationship between physical activity and blood pressure (p-value = 1). From the analysis results, it was also obtained that the PR (Prevalence Ratio) value was not significant because it was <1 and was in the CI range of 0.978 (95% CI: 0.488 – 1.961).

3.3 Relationship Between Fiber Intake and Blood Pressure

Based on table 3 it is known that respondents with high blood pressure were found to have more (63%) who had deficient fiber intake than respondents with sufficient fiber intake (7.1%). This indicates a tendency that the lower the fiber intake, the higher the blood pressure of obese respondents. Based on the results of statistical tests showed a significant relationship between fiber intake and blood pressure (p-value = 0.002). From the results of the analysis, the PR (Prevalence Ratio) value of 8.815 means that respondents who consume less fiber have an 8.8 times chance of experiencing high blood pressure compared to respondents who consume enough fiber.

3.4 Relationship Between Proportion of Fat Intake and Blood Pressure

Based on table 4, it is known that respondents with high blood pressure were found to be more (66.7%) who had excessive fat intake proportions compared to respondents with sufficient fat intake proportions (11.8%). This indicates that there is a tendency that the higher the proportion of fat intake, the higher the

blood pressure of obese respondents. Based on the results of statistical tests showed a significant relationship between the proportion of fat intake with blood pressure (p-value = 0.002). From the results of the analysis, it was also obtained that the PR (Prevalence Ratio) value of 5.667 means that respondents who have a proportion of excess fat intake have a 5.6 times chance of experiencing high blood pressure compared to respondents who have a sufficient proportion of fat intake.

4 DISCUSSION

4.1 Relationship Between Physical Activity and Blood Pressure

The level of physical activity is one of the factors that can affect blood pressure in someone who is obese. Obesity occurs due to low energy expenditure compared to the energy consumed. The lower a person's level of physical activity, the higher their blood pressure due to a high heart rate when the person is physically active (Mayoclinic, 2021; WHO, 2016).

The results showed that there was no significant relationship between physical activity and blood pressure in obese employees at Jakarta Islamic Hospital (p-value = 1,000). This is because there are other causes of increased blood pressure such as stress conditions, age, and poor diet in obese people (Putriastuti, 2016). Meanwhile, in this study, the

increase in blood pressure in obese employees is more influenced by poor eating patterns such as low fiber and high fat so the results show that there is no significant relationship between the level of physical activity and blood pressure in obese employees at Jakarta Islamic Hospital in 2021.

This study is not in line with the research of Rihiantoro and Widodo (2018) which states that there is a relationship between physical activity and the incidence of hypertension (high blood pressure) at the Tulang Bawang I Health Center with a p-value of 0.005 and an OR (Odds Ratio) of 2.255 (Rihiantoro & Widodo, 2018). This is caused by differences in characteristics and the number of respondents. Respondents in Rihiantoro and Widodo's research (2018) were patients at the Tulang Bawang I Public Health Center where the level of physical activity tended to vary. While the respondents in this study were employees of Jakarta Islamic Hospital, most of whom were nurses. In addition, the number of respondents in Rihiantoro and Widodo's (2018) study was more (n = 64) compared to this study (n = 41).

This study is also not in line with Putriastuti's research (2016) which also states that there is a significant relationship between exercise status and the incidence of hypertension (high blood pressure) in middle age patients (45-59 years) at Kedurus Health Center Surabaya with a p-value of 0.001. On the other hand, this study also states that there is no relationship between the frequency and duration of exercise with the incidence of hypertension with p-values of 0.068 and 0.710, respectively. The absence of a relationship between the frequency and duration of exercise with the incidence of hypertension in patients is also due to other causes of increased blood pressure such as stress conditions, age, and poor diet in obese patients (Putriastuti, 2016).

4.2 Relationship Between Fiber Intake and Blood Pressure

Fiber has an important role in blood pressure in obese patients (Khomsan et al., 2004; WHO, 2016). When a person consumes less fiber, bile acids will absorb cholesterol resulting in a build-up in the blood vessels (Gropper et al., 2009; Thompson et al., 2011).

The results showed that there was a significant relationship between fiber intake and blood pressure in obese employees at Jakarta Islamic Hospital (p-value = 0.002). In addition, the PR value (Prevalence Ratio) of 8.815 means that respondents who consume less fiber have an 8.8 times chance of experiencing high blood pressure compared to employees who consume enough fiber.

This study is in line with the research of Yuriah et al. (2019) which states that there is a relationship between fiber intake and blood pressure in hypertensive patients at the Gondokusuman I Health Center Yogyakarta with a p-value of 0.03 and an OR (Odds Ratio) value of 10.24, which means that patients with stage I hypertension consume fiber 10,24 times more than patients with stage II hypertension (Yuriah et al., 2019). The research of Ramadhani et al. (2017) also mentioned that there was a relationship between fiber intake and systolic and diastolic blood pressure in adult patients at Roemani Muhammadiyah Hospital Semarang with p-values of 0.001 and 0.008, respectively (Ramadhani et al., 2017). Other studies have also shown a significant relationship between low fiber intake and the incidence of high blood pressure (Bertalina & Muliani, 2016; Kholifah et al., 2015).

4.3 Relationship Between Proportion of Fat Intake and Blood Pressure

Obese people tend to often consume foods that contain high fat in large portions (Gandy et al., 2014; Hardinsyah & Supariasa, 2016). High consumption of fat, especially saturated fat, is associated with increased body weight which increases the risk of high blood pressure. Consumption of saturated fat can increase cholesterol in the blood. Cholesterol will clog blood vessels by forming atherosclerosis (Almatsier, 2016). Clogged blood vessels cause an increase in blood pressure (WHO, 2013).

The results showed that there was a significant relationship between the proportion of fat intake and blood pressure in obese employees at Jakarta Islamic Hospital (p-value = 0.002). In addition, a PR (Prevalence Ratio) value of 5.667 was also obtained, which means that respondents who have a proportion of excess fat intake have a 5.6 times chance of experiencing high blood pressure compared to employees who have a sufficient proportion of fat intake.

This is in line with Sari's research (2019) which states that there is a relationship between fat intake and blood pressure in adults in Lubuk Buaya Padang with a p-value of 0.000 (J. N. Sari, 2019). The research of Ramadhani et al. (2017) also mentioned that there was a relationship between fat intake and systolic and diastolic blood pressure in adults at Roemani Muhammadiyah Hospital Semarang with p-values of 0.000 and 0.004, respectively (Ramadhani et al., 2017). Other studies have also shown a significant relationship between high fat intake and the incidence of obesity and high blood pressure

(Susanti, 2015). Patients with level II hypertension consume 7.51 times more fat than patients with level I hypertension (Yuriah et al., 2019).

5 CONCLUSIONS

Based on the research results, it can be concluded that the age of respondents is from 29 to 53 years old, most of them are female and have grade II obesity. Most of the respondents have normal blood pressure, low physical activity and fiber intake, and also excessive proportion of fat intake. There is no significant relationship between physical activity and blood pressure in obese employees at Jakarta Islamic Hospital. There is a significant relationship between fiber intake and the proportion of fat intake with blood pressure in obese employees at Jakarta Islamic Hospital.

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