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Relationship between Diet Pattern and Physical Activity with the Risk of Hypertension in Adolescents

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Abstract:
Hypertension is still a significant public health problem in Indonesia. One of the causes is poor diet and physical activity. Lifestyle modifications are made to prevent the risk of hypertension. This study aims to determine the correlation between diet and physical activity and hypertension risk (pre) in adolescents aged 15-18 years in the Senduro Health Center working area, Lumajang Regency. This study uses a type of quantitative research; the research design used is a descriptive correlation and uses a cross-sectional study design. The total population was 55 adolescents who visited the Sendero Health Center. Sampling was done on 48 adolescents using a purposive sampling technique. Data collected used a questionnaire and then analyzed using data analysis using chi-square test. This study found that adolescents with an unhealthy diet were 35 (70%), and adolescents who did light physical activity were 40 (80%). Adolescents who had blood pressure in the hypertension category were 37 (74%). The logistic regression statistical test results show the significance value is 0.003 (<0.05), indicating that adding independent variables can provide a significant correlation to the dependent variable model. So, there is a correlation between diet and physical activity with the risk of hypertension in adolescents. The results of this study are expected to provide insight and related knowledge to improve a diet pattern and do physical activity to maintain health and prevent hypertension.

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INTRODUCTION

Hypertension or high blood pressure is a dangerous disease that can significantly increase the risk of other diseases such as heart disease, stroke, kidney failure, and needs. Several factors play a role in causing hypertension, including uncontrollable risks (significant) and controllable risk factors (minor). Uncontrollable risk factors (significant) such as heredity, gender, race, and age. At the same time, Controllable risk factors (minor) are obesity, lack of exercise or activity, smoking, drinking coffee, alcoholism, stress, work, education, and diet (WHO, 2019). Primary health research data (Riskesdas) showed the prevalence of hypertension from 31.7% to 25.8% in 2013 and increased again to 34.1% in 2018 (Kementerian Kesehatan RI, 2018).. According to WHO (2019), of the total world population, the prevalence of hypertension globally is 22%, and less than one-fifth of sufferers make efforts to control their blood pressure (Arisandi, 2020).

The prevalence of hypertension in Indonesia, according to Riskesdes in 2018, based on measurement results in the population aged ≥ 18 years, was 34.1%; the highest was South Kalimantan (44.1%), and the lowest was Papua (22.2%) (Kementerian Kesehatan RI, 2018)). A preliminary study conducted by researchers at the Senduro Health Center, Lumajang Regency,

found that hypertension was among the highest non-communicable diseases in the Senduro Health Center. The data on hypertension aged ≥ 60 years in 2022 was 1996, consisting of 847 male sufferers and 1149 female sufferers. Meanwhile, in Senduro village, there were 64 people with hypertension aged ≥ 60 years, consisting of 20 men and 44 women. Blood pressure in hypertension patients at the Senduro Community Health Center averages 140 mmHg to 200 mmHg. When it recurs, they consume herbal plants to lower blood pressure, buy medicine at the stall, and seek treatment at the Community Health Center or the nearest health service.

Several studies have shown that hypertension can appear since adolescence, and its prevalence has increased over the last few decades; Joint National Committee (JNC) VII 2013 found a national prevalence of 5.3 percent (males 6.0% and females 4.7%). Unrecognized hypertension in adolescence can continue into adulthood and increase the risk of morbidity and mortality (Kisno Saputri et al., 2021).

To prevent hypertension, risk factor modification or lifestyle modification is carried out. According to the Indonesian Ministry of Health, lifestyle modification can be done through a healthy lifestyle. Healthy lifestyles include consuming nutritious foods and reducing excessive sugar, salt, and fat consumption. In addition to regulating diet, regular physical activity or exercise can be done to live a healthy lifestyle (Riyadina, 2019). Based on the description above, researchers are interested in analyzing the relationship between diet and physical activity on the risk of hypertension in adolescents.

METHOD

This study used a cross-sectional approach. The population in this study were all adolescents with hypertension in the working area of Senduro Health Center, Senduro District, Lumajang Regency, totaling 55 people. The sampling technique used was purposive sampling, and a sample of 50 adolescents was obtained. The dependent variable was measured using the questionnaire. Data analysis was performed using the Regression Logistic with the interpretation of H1 accepted if p-value ≤ α, with α = 0.05.

RESULT

General Data of Respondents

Table 1. Frequency distribution of respondent characteristics

Characteristics	Frequency	Percentage
Gender		
Male	25	50
Female	25	50
Age		
Middle teens	43	86
Late teens	7	14
Education		
Junior high school	18	36
Senior high school	32	64
Family history of hypertension		
Yes	15	30
No	35	70
Total	30	100

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The table above shows that the number of male and female respondents in this study is the same, namely 25 (50%) male and 25 (50%) female. Most respondents are in their middle adolescence, ranging from 14-17 years, namely 43 (86%) respondents, while the other 7 (14%) respondents are in their late adolescence, ranging from 18-24 years. In addition, most respondents have a current high school education level education, as many as 32 (64%) respondents. Then, 18 (36%) respondents currently have a junior high school education, and the majority do not have a history of hypertension in their family, namely 35 (70%) respondents. While 15 (30%) respondents have a family with a history of hypertension.

Diet Pattern

Table 2. Frequency distribution of diet pattern

Diet Pattern	Frequency	Percentage
Healthy	15	30
Unhealthy	35	70
Total	50	100

Table 2 above shows that most respondents, 35 (70%), have unhealthy eating patterns. Then, 15 (30%) teenagers have healthy eating patterns.

Physical Activity

Table 3. Frequency distribution of physical activity

Physical Activity	Frequency	Percentage
Light	40	80
Medium	10	20
Heavy	0	0
Total	50	100

Table 3 shows that most respondents, namely 40 (80%) teenagers, did light activities, and the remaining 10 (20%) teenagers did moderate activities.

Blood Levels in Adolescents at Risk of Hypertension

Table 4. Frequency distribution of blood levels

Blood Pressure	Frequency	Percentage
Normal	0	0
Prehypertension	13	26
Hypertension	37	74
Total	50	100

Table 4 above shows that most respondents, 37 (74%) teenagers, have blood pressure in the hypertension category, while 13 (26%) other teenagers have blood pressure in the prehypertension category.

Table 5. Logistic Regression

Chi-square	df	Sig.
52.922	28	0.003

The table above shows that based on the logistic regression statistical test results, the Chi-square count value is obtained > Chi-square table of 28, 52.992 > 40.113. Alternatively, the significance value is 0.003 (<0.05), indicating that adding independent variables can affect the dependent variable model. So, there is a relationship between diet and physical activity with the risk of hypertension in adolescents.

DISCUSSION

The results of this study indicate that 15 (30%) of adolescents in the Senduro Lumajang Health Center work area are research respondents with a healthy diet. Then, the remaining 35 (70%) adolescents have an unhealthy diet. These results align with research conducted by Faisal et al. (2022), which states that based on diet, most of the samples are in an unhealthy or high-risk category, namely 40 people (57.1%). The results also align with research by Waluyani et al. (2022), which states that 30 (60%) adolescents have poor or unhealthy diets. Eating patterns, according to Handajani, are human or group human behavior in fulfilling food, which includes attitudes, beliefs, and food choices, while according to Suhardjo, eating patterns are interpreted as the way a person or group of people choose food and consume food against physiological, psychological, cultural and social influences. According to an expert, eating patterns are defined as characteristics of repeated activities of individuals or each person eating to meet food needs. (Sulistyoningsih, 2011). Eating patterns are a system in which a person regularly performs repetitive habits regarding aspects of their food needs. Everyone has different needs depending on gender and age group (Waluyani et al., 2022).

The results of this study also show that out of 50 respondents, there were no (0%) adolescents who did heavy activities. 40 (80%) adolescents did light activities, and 10 (20%) of the remaining adolescents did moderate activities. This is in line with research conducted by Kisno Saputri et al. (2021), which showed that the majority of adolescents, as many as 44 (58.67%), did light physical activities, then 19 (25.33%) adolescents did moderate physical activities, and the remaining 12 (16%) adolescents did heavy physical activities.

Physical activity is all activities that result in an increase or expenditure of energy, which is essential for physical and mental maintenance and can maintain quality of life so one can be healthy and fit throughout the day. Regular physical activity can increase endurance, prevent obesity, improve circulation, and lower blood pressure. Physical activity is a positive behavior as a controller of energy balance; every body movement causes increased expenditure or burning of energy (Kisno Saputri et al., 2021). There are several benefits of activity, according to Widjaja (2020), including controlling body weight, controlling blood pressure, improving posture, improving joint flexibility and muscle strength, and controlling stress.

The results of this study showed that 13 (26%) adolescents had blood pressure in the prehypertension category, and 37 (74%) respondents had blood pressure in the hypertension category. These results are more or less in line with research conducted by Faisal et al. (2022),

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which showed that the majority of adolescents, namely 44 (62.9%) adolescents, had blood pressure in the hypertension category, and the remaining 26 (37.1%) were not in the hypertension category.

WHO (2019) defines hypertension as a condition with increased blood pressure. Blood is carried from the heart through blood vessels. The heart functions to pump blood into the blood vessels with each beat. The higher the blood pressure in the blood vessels, the harder it is for the heart to pump. Generally, hypertension occurs in the elderly, but it is possible for it to occur in adolescents. Adolescence, the transition from children to adults, causes adolescents to be different from children and adults in terms of lifestyle and habits as well as metabolic changes in the body. Lifestyle changes make adolescents susceptible to various diseases, one of which is hypertension. The mechanism of hypertension in adolescents is influenced by several factors related to lifestyle. These factors include being overweight or obese, a history of hypertension in the family or genetic factors, race or ethnicity, gender, low birth weight, high salt consumption, smoking, physical activity or sports, and low knowledge (Siswanto et al., 2020; Kurniyawan, et al., 2024).

The results of this study indicate that based on the results of the regression test, the Chi-square count value> Chi-square is 52.992> 40.113. Alternatively, the significance value is 0.003 (<0.05), indicating that the addition can significantly affect the dependent model. So, there is a relationship between diet and physical activity with the risk of hypertension in adolescents. This study's results align with research by Faisal et al. (2022), showing a relationship between diet and the incidence of hypertension in male adolescents in the Nambo Health Center work area. The results of research conducted by Hasanuddin et al. (2023) also stated that there is a relationship between diet and the incidence of hypertension.

Cross-testing of diet in this study resulted in that out of 15 (30%) adolescents with a healthy diet, there were 12 (80%) adolescents with blood pressure in the prehypertension category and the remaining 3 (20%) in the hypertension category. Furthermore, of the 35 (70%) adolescents with unhealthy eating patterns, there were 34 (97%) adolescents in the hypertension category and 1 (3%) adolescents in the prehypertension category. This indicates that the relationship has a positive pattern, which means that the more unhealthy the diet, the higher the blood pressure of the adolescent. Cross-testing on physical activity showed that 10 (100%) adolescents with blood pressure in the prehypertension category in moderate physical activity. Respondents with light activity had more grade 1 hypertension (5.6%) than respondents with moderate and heavy activity (0.8% and 1.6%). This indicates that the relationship has a pattern that means the lighter the physical activity, the higher the blood pressure in adolescents.

There are two types of hypertension in adolescents, namely those that can be changed and those that cannot. Factors that cannot be changed include age and gender. At the same time, those that can be changed include smoking habits, lack of physical activity, lack of fruit and vegetable consumption, excessive salt consumption, stress, overweight/obesity, high-fat diet, and employment status. The results of a study by Kusparlina (2022) stated that BMI and physical activity are two factors that influence the incidence of hypertension in adolescents. A literature review conducted by Putra Surya et al. (2022) concluded that seven risk factors have a significant relationship with the incidence of hypertension in adolescents, namely lifestyle, smoking habits, unhealthy diet, lack of physical activity, nutritional status, excess weight, or obesity. Hypertension in adolescents often begins with obesity-related to lifestyle (Siswanto et al., 2020). Lifestyle has the most significant impact on the incidence of hypertension. Today's lifestyle, especially in adolescents, changes over time because it is becoming instant (Putra Surya et al., 2022).

The eating patterns of adolescents, especially girls, tend to prefer consuming instant foods that are fatty or high in sodium. Salt intake patterns in the diet can also reduce the risk of hypertension. Excessive sodium consumption causes sodium concentrations in extracellular fluids

to increase (Shapo, 2003 in Siswanto et al., 2020). The leisurely lifestyle, which can be accessed via smartphones, makes many people rarely do physical activities such as exercising, walking, playing physical games, or other activities. In addition, teenagers now prefer to spend their free time playing games on smartphones, discussing and relaxing by eating with peers in a cafe, watching TV, taking lessons, or taking tutoring outside school hours, which forces them to sit longer than they should (Wahyudi & Albary, 2021).

Researchers assume, based on the explanation above, that there is a relationship between diet and physical activity with the incidence of hypertension in adolescents due to changes in lifestyle with high consumption of fatty, salty foods, low consumption of fruits and vegetables, and lack of activity due to a large number of motorized vehicles. The tendency of adolescents to consume fatty and salty foods can increase the risk of hypertension because both foods affect blood flow. Lack of physical activity in adolescents also causes the risk of hypertension due to lack of elasticity of the heart and blood vessels.

CONCLUSION

The logistic regression statistical test results showed a significance value of 0.003 (<0.05), indicating that adding independent variables can provide a significant relationship to the dependent variable model. So, it can be seen that there is a relationship between diet and physical activity with the risk of hypertension in adolescents.

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CONFLICT OF INTEREST

The limitation of this research is that it takes quite a long time because it is challenging to find teenagers willing to be research respondents.

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