

The Relationship between Physical Activity Patterns and Dietary Patterns with Overweight Incidence in Adolescents Age 13-15 Years at Purwajaya Junior High School

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ABSTRACTS

Nutritional problems are a problem that still cannot be fully addressed in every country. One of the nutritional problems that cannot be completely overcome is the problem of overweight. Several factors cause overweight are physical activity and diet. This study aims to determine the relationship between physical activity and diet with the incidence of overweight in adolescents aged 13-15 years at Purwajaya Junior High School. This research is a descriptive correlational study with a cross sectional approach. The population in this study was 93 students consisting of students in grades VII A and VII B. The sample size in this study was 48 students who were taken by purposive sampling. The respondent's dietary patterns were obtained by interview using a 24-hour food recall and a food frequency questionnaire (FFQ). The respondent's physical activity pattern was obtained by interview using the IPAQ (International Physical Activity Questionnaire). The results of this study indicate a significant relationship between diet and the incidence of overweight with a p value of 0.002 and a correlation coefficient of 0.336. It also shows a significant relationship between physical activity and the incidence of overweight with a p value of 0.000 and a correlation coefficient of -0.554. The conclusion in this study is that there is a significant relationship between physical activity patterns and dietary patterns with the incidence of overweight in adolescents aged 13-15 years at Purwajaya Junior High School.

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1. Introduction

Nutritional problems are a problem that still cannot be fully addressed in every country. Because there are many factors cause increasing nutritional problems. One of the nutritional problems that cannot be completely addressed is the problem of overnutrition. In developing countries, the problem of overnutrition is still high, including in Indonesia. Groups that are vulnerable to nutritional problems are teenagers. Special attention about adolescent nutrition problems must be obtained along with the increase in the young adult population in Indonesia because this can affect the development and progress of the body, and will affect adult nutrition problems (Mulyana & Nugroho, 2020).

Adolescence is a vulnerable to nutritional problems because the transition period from childhood to adulthood which is characterized by physical, physiological, and psychosocial changes. This period is marked by rapid growth and change from children to young adults. Biological changes that occur during adolescence include sexual maturation, increase in height and weight, accumulation of bone mass, and body composition. However, because this group is in a period of rapid growth (growth spurt), it requires relatively large amounts of nutrients depending on the portion or needs. (Pujiati, Arneliwati, & *et al*, 2017).

Based on data from the World Health Organization (2021) more than 340 million children and adolescents 5-19 years are overweight. The overweight prevalence of children and adolescents aged 5-19 years has increased to 18% for girls and 19% for boys in 2016 which was initially only 4% in 1975.

The factors that influence nutritional problems in adolescents are physical activity and diet. High energy intake and not balanced by an unbalanced use of energy (absence of energy) can encourage weight gain. Lifestyle changes result in changes in adolescent diet which refers to a high-calorie diet, junk food, fast food, fat and cholesterol and is not balanced with physical activity which can lead to more nutritional problems (Nugroho, Mulyadi, & *et al*, 2018).

Lack of activity has a negative impact on the body of teenagers until adulthood. Lack of physical activity causes various diseases and without realizing it they have wasted the opportunity to meet the movement needs that are needed to burn calories in the body and launch their metabolism. When a person's nutritional intake is excessive, it will cause an imbalance in the body, this is also very contrary to balanced nutrition guidelines. Imbalance between intake needs will cause nutritional problems. If a person's nutritional intake does not match their needs, such as excess nutrition that occurs due to too much food intake. The consequences of excess nutrition include decreased immunity (susceptibility to disease), disturbances in the process of growth and development, difficulty in receiving education and knowledge about nutrition and excess energy can also reduce labor productivity in adulthood. (Nugrahaini & Wahjuni, 2019).

Nutritional problems in adolescents are not immediately corrected and will affect the quality of society in the future, so it is necessary to seek further information on nutritional problems in adolescents, especially junior high school students about the factors causing overnutrition so that these risk factors can be identified as early as possible and overcome well (Aini, 2013).

The occurrence of overnutrition has been widespread in many countries, especially in developing countries. The fourth most populous country in the world, Indonesia, is still experiencing an increase in overweight. The results of the Indonesian Basic Health Research Survey (2018) reported that in 2018 as many as 16.0% of adolescents aged 13-15 years were classified as overweight and 13.5% for adolescents 16-18 years.

East Kalimantan in 2018 was ranked the 4th highest in cases of overweight adolescents 13-15 years old. Samarinda region ranks 8th highest in overweight cases with 10.42% of cases. Kutai Kartanegara ranks 6th highest in overweight cases, which is 11.40%. (Riskasdas, 2018).

According to data from the Samarinda City Health Office (2020) in the health screening of junior high school children at 12 health centers in Samarinda, data on teenagers with overweight conditions was found as many as 167 people. In the working area of the Karang Asam Public Health Center, the highest prevalence was found at SMPN 10 Samarinda, which was 10% overweight cases (Puskesmas Karang Asam, 2020).

According to data from the Kutai Kartanegara District Health Office (2020) in the health screening of junior high school children from 32 health centers in Kutai Kartanegara, out of a total of 13,377 students there were children with overweight nutritional status as much as 7%. In the working area of the Loa Janan Health Center, the 6th highest prevalence was found in Purwajaya Junior High School, which was 17% overweight cases (Puskesmas Loa Janan, 2020).

2. Materials and Methods

This research is a descriptive correlational study with a cross sectional approach. The dependent variable in this study was the incidence of overweight, while the independent variables were diet and physical activity. The samples used in this study were students of class VIII SMP Purwajaya, Kutai Kartanegara Regency as many as 48 students were taken by purposive sampling technique. Nutritional status data obtained from anthropometric measurements based on BMI/U. Consumption patterns were obtained using the Food Frequency Questionnaire (FFQ) and recall 1 x 24 hours. The respondents' physical activity in one week was measured using the IPAQ (International Physical Activity Questionnaire). Data processing in this study consisted of four stages, namely editing, coding, processing and cleaning. Data analysis was carried out including univariate and bivariate analysis. The bivariate analysis technique in this study used the Pearson correlation test using IBM SPSS Statistics 22 software.

3. Results and Discussion

3.1 Result

3.1.1 Frequency Distribution of Respondents Characteristics

No	Age	Frequency	Percentage (%)
1	13 Years	1	2
2	14 Years	27	56.3
3	15 Years	20	41.7
	Total	48	100
No	Sex	Frequency	Percentage (%)
1	Male	24	50%
2	Female	24	50%
	Total	48	100%

Based on Table 3.1.1, it can be seen that from 48 respondents there are 27 respondents (56.3%) most of whom are 14 years old. Based on table 3.1.1, it can be seen that from 48 respondents there were 24 respondents (50%) male and 24 respondents (50%) female.

3.1.2 Frequency Distribution of Parental Characteristics

No	Income	Frequency	Percentage (%)
1	300.000 – 2.000.000	19	39
2	2.000.000 – 5.000.000	21	44
3	6.000.000 – 8.000.000	7	15
4	9.000.000 – 10.000.000	1	2
Total		48	100

Based on Table 3.1.2 it can be seen that from 48 respondents there are 21 respondents (44%) parents of students who have the most income of Rp. 2,000,000 – Rp. 5,000,000.

No	Father Education	Frequency	Percentage (%)
1	Primary School	9	19
2	Junior High School	17	35
3	Senior High School	20	42
4	College	2	4
Total		48	100

No	Mother Education	Frequency	Percentage (%)
1	Primary School	8	16
2	Junior High School	20	42
3	Senior High School	19	40
4	College	1	2
Total		48	100

Based on Table 3.1.2 it can be seen that from 48 respondents there are 20 respondents (42%) parents of students (fathers) most of whom have the last education of senior high school equivalent. And there are 20 respondents (42%) parents of students (mothers) most of whom have the latest education in junior high school.

3.1.3 Distribution of Dietary Frequency

No	Dietary	Frequency	Percentage (%)
1	Low	16	33
2	Moderate	13	27
3	Good	19	40
Jumlah		48	100

Based on Table 3.1.3 it can be seen that from 48 respondents there are 19 respondents (40%) who mostly have a good diet.

No	Intake	Total Intake	AKG	Percentage (%)
1	Energy	1885.2	2225	84.7
2	Carbohydrat	275	325	84.6
3	Protein	77	68	113.2
4	Fat	81.3	75	108.4

Based on table 3.1.3, it can be seen that from 48 respondents the average intake of energy, carbohydrates and fat looks normal (80 – 110%). Only protein is still in excess (80 – 110%).

3.1.4 Distribution of Physical Activity Frequency

No	Physical Activity	Frequency	Percentage (%)
1	Low	18	38
2	Moderate	27	56
3	High	3	6
Jumlah		48	100

Based on Table 3.1.4 it can be seen that from 48 respondents there are 27 respondents (56%) who mostly have moderate physical activity patterns.

3.1.5 Distribusi Frekuensi Status Gizi

No	Nutritional Status	Frequency	Percentage (%)
1	Malnutrition	1	2
2	Poor Nutrition	4	8
3	Good Nutrition	27	56
4	High Nutritional	8	17
5	Obesity	8	17
Jumlah		48	100

Based on Table 3.1.5 it can be seen that from 48 respondents there are 27 respondents (56%) have good nutritional status, 1 respondent (2%) has poor nutritional status, 4 respondents (8%) have poor nutritional status and 8 respondents (17%) had high nutritional status and 8 respondents (17%) had obesity nutritional status.

3.1.6 Relationship between diet and overweight

Category	Status Gizi				Total		P Value (95% CI)
	Overweight		Normal				
	F	%	F	%	F	%	
Low	0	0	16	33	16	33	0.002
Moderate	0	0	14	30	14	30	
Good	8	17	10	20	18	37	
Total	8	17	40	83	48	100	

Based on Table 3.1.6 above, out of 48 respondents, 8 respondents (17%) had a good diet with overweight nutritional status.

3.1.7 Relationship of Physical Activity Patterns with Overweight

Category	Status Gizi				Total		P Value (95% CI)
	Overweight		Normal				
	F	%	F	%	F	%	
Low	14	29	4	8	18	37	0.000
Moderate	2	4	25	52	27	56	
High	0	0	3	7	3	7	
Total	16	33	32	67	48	100	

Based on Table 3.1.7 above, out of 48 respondents, 16 respondents (33%) each had low and moderate physical activity and had overweight nutritional status. And 32

respondents (67%) each have various physical activities (Low, Adequate and High) and have general nutritional status other than overweight.

The results of the Pearson Chi-Square statistical test showed that $p \text{ value} = 0.000 < 0.05$, then H_0 was rejected and H_a was accepted, which means that there is a significant relationship between diet and physical activity with the incidence of overweight..

3.2 Discussion

3.2.1 *The Incident of Overweight in Adolescents at Purwajaya Junior High School*

The incidence of overweight is a condition where the ratio of weight and height exceeds the specified standard. Based on data collection in January 2022 for 48 respondents, namely Purwajaya Junior High School students aged 13-15 years, the results were 48 respondents, 8 students (17%) were not overweight, 8 students (17%) were obese, 5 students (10%) experienced malnutrition and 27 students (65%) did not experience all three (normal).

These results indicate that students who are overweight are still found and can last quite a long time due to the storage of calories in fat tissue. Overweight can occur due to an energy imbalance over a long period of time, namely energy expenditure is smaller than the amount of energy consumed. Excessive energy intake, energy expenditure in the form of low physical activity, or a combination of these two factors cause energy balance to move in a positive direction.

The incidence of overweight can be associated with lifestyle changes such as diet and physical activity, including social relationships, habits, culture, physiological, metabolic, and genetic factors (Sudargo, 2014).

The results of the study (Septa Katmawanti, 2019) that the risk factors for overweight are diet, heredity history, lifestyle, physical activity and environment. The lives of teenagers who have the habit of consuming foods high in carbohydrates, fat, sugar and the habit of eating fast food and the imbalance between nutritional consumption and the nutritional adequacy needed. Teenagers often eat foods that contain high carbohydrates such as rice and tubers and fat from fried foods, the accumulation of body fat because the number of calories in fast food in one meal exceeds the daily calorie or fat amount.

In my opinion, too, if the intake of energy that enters the body is excessive for a long period of time and is not balanced with sufficient physical activity, it can result in a person experiencing excess nutrition (overweight).

3.2.2 *Dietary*

Diet is an effort in regulating the amount and type of food. Based on the results of the study, it was found that of the 48 respondents, most of the eating patterns were good, namely 19 students (40%), 16 students (33%) had poor eating patterns and 14 students (27%) had adequate diets. . The students' eating patterns in this study were based on the frequency of eating for 1 week and the amount of daily intake through food recall 1x24 hours. Snacks are foods eaten between large meals, especially between breakfast and lunch and between lunch and dinner. Teenagers in this study preferred snacks in the form of snacks/cakes. Several studies in western countries found indications that with an increase in snack eating habits, the total energy intake also increases. In the table In table 4.8, students' energy intake is normal, there are 41 students (85%) and 7 students (15%) have a deficit energy intake. In table 4.8, the normal carbohydrate intake of students is 29 students (60%) and 19 students (40%) have a deficit carbohydrate intake.

In table 4.8, the normal protein intake of students is 4 students (8.5%), 4 students (8.5%) have normal intake and 40 students (83%) have excess protein intake. In table 4.8, the normal fat intake of students was 7 students (15%), 4 students (8%) had a deficit intake and 37 students (77%) had excess fat intake. Based on the results of interviews through a food recall form 1x24 hours, it shows that overweight children eat more lunch in the form of snacks and dinner in the form of fast food such as noodles, fried chicken, pentol, chocolate and other snacks.

Increased consumption of processed foods that are easy to consume causes a shift in eating habits in adolescents. These foods are fast food that has a higher energy density than traditional foods in general, causing excessive energy intake. Stimulants such as coffee, tea, milk and soft drinks can increase blood sugar levels, either directly or indirectly (Arisman, 2009).

3.2.3 *Physical Activity Pattern*

Physical activity is body movement that assisted by skeletal muscles and requires energy to do so. Based on the results of the study, it was found that 18 respondents (38%) did light activity, 27 respondents (56%) did moderate activity and 3 respondents (6%) did high physical activity. Physical activity in this study was divided into low activity, moderate activity and high activity. Physical activity is something that is recommended for everyone to be able to maintain and improve body freshness. Physical activity is useful for improving blood circulation and burning calories. Based on the results of research on physical activities that are often carried out by adolescents are sports such as running, brisk walking, gymnastics, high jumps (skipping), muscle strength training such as push ups, back ups, sit ups, playing badminton and also soccer.

Research conducted on adolescents found data that they do more activities in a sitting and lying position such as watching television, doing assignments, playing games or just spending time relaxing. And during their free time most teenagers only occasionally do physical activity or sports. Low physical activity can be caused by energy intake that enters only a little used for activities and most of it is stored as body fat, in other words, overweight and obese groups only use little energy to carry out their activities.

Recent health trends show that the prevalence of overweight is increasing along with increased sedentary behavior and reduced physical activity. Sedentary behavior is the behavior of sitting or lying down in everyday life both at work (working in front of the computer, reading, etc.), at home (watching TV, playing games, etc.), on trips or transportation (buses, trains, motorbikes, etc.) (Proverawati, 2010).

3.2.4 *The Relationship between Eating Patterns for Teenagers Age 13 – 15 Years with the Incidence of Overweight in Purwajaya Junior High School*

Statistical results show that there is a significant relationship between diet and the incidence of overweight students/grade VII at SMP Purwajaya Kutai Kartanegara. The P value is $0.002 < 0.05$ and the correlation coefficient $r = 0.336$, which means that the relationship between diet and the incidence of overweight is quite strong with a positive correlation direction, so that the relationship between the two variables is unidirectional.

The relationship between eating patterns and the incidence of being overweight shows that the better the students' diet, the more likely they are to have overweight nutritional status. This is also in line with research conducted (Afrilia & Festilia, 2018). Based on the results of statistical tests using the chi-square test, there is a relationship between diet and nutritional status ($p = 0.016 < 0.05$). In addition, students with more

nutritional status were found in students with good eating patterns, namely 18.5%.

Based on the results of research from 48 students who have normal nutritional status as many as 27 students (56%) have a poor diet, poor eating patterns in students with normal nutritional status can be caused by busy times so they can only eat once a day with a large portion of food at each meal, it is possible that the student has a normal nutritional status. Based on the results of interviews with some respondents said that in a day they only eat one to two times and even rarely eat breakfast when going to school. This is because the school time is longer which requires students to leave early and return in the afternoon, in addition, many students argue that they do not usually eat breakfast because they are afraid of stomach pain.

Based on the results of the study, 8 students (17%) had overweight nutritional status, 8 students (17%) had a good diet. And from 8 students (17%) who have obesity nutritional status as many as 8 students have a good diet as well. Meanwhile, 5 students (10%) who have poor nutritional status as many as 2 students have a poor diet and 3 students have an adequate diet. Several factors that can influence the respondent's diet and intake are parents' income, pocket money and parents' education. Because at the time of interviewing the respondents, the average respondent used their pocket money to buy snacks such as pentol, sausages and fried foods. A good diet does not rule out the possibility of students having more nutritional status in this case being overweight or obese. If the frequency of eating patterns looks good but the portion, amount and weight of food consumed in excess will lead to more nutritional status, namely overweight.

One of the factors that influence nutritional status, especially overweight, is diet. Diet is the most important behavior that can affect nutritional status. A good diet is guided by balanced nutrition (Kemenkes, 2014). Early teens who are categorized as junior high school (SMP) students, where there are many activities and consumption that is not fully controlled by parents. Nutritional status is an important thing that must be known by every individual in order to be able to anticipate and prevent the occurrence of undernutrition and overnutrition (Syahfitri, 2016). The proportion of Indonesia's population according to the level of energy sufficiency in 2014 in the age group of 13-18 years is very less 52.5%, less than 30.3%, normal 12.2%, and more than 5.0% (Kemenkes RI, 2016). Meanwhile, according to gender, women are very less 46.7%, less 33.4%, normal 14.1% and more than 5.8% (Kemenkes RI, 2016).

Eating habits that are often seen in adolescents include eating snacks, skipping meals, especially breakfast, irregular meal times, often eating fast food, rarely consuming vegetables, fruit and or dairy products (dairy food) as well as controlling body weight in adolescents. Princess. This can result in food intake not according to needs and balanced nutrition with the result being less or more nutrition (Irianto, 2016). Based on the results of interviews, several students said that they often skip meals during breaks because there are many tasks that must be completed right away. Moreover, we are in a pandemic period, where every school is given a teaching time limit so that there is not much rest time that can be given to its students.

3.2.5 The Relationship between Physical Activity of Adolescents Age 13 – 15 Years with the Incidence of Overweight in Purwajaya Junior High School

There is a significant relationship between physical activity and the incidence of overweight students in grade VII SMP Purwajaya Kutai Kartanegara with a P value of $0.000 < 0.05$ and a correlation coefficient of $r = -0.554$ which means that the relationship between physical activity and the incidence of overweight is classified as moderate with the direction of the correlation is negative, so that the relationship between the two

variables is not unidirectional, which means that the lower the intensity of physical activity, the effect on the nutritional status (BMI/U) of fat and even obesity. This is in line with research conducted by Adelita in 2020. The results of the analytical test showed that there was a relationship between physical activity and the nutritional status of junior high school students in Bandung. The conclusion is that there is a relationship between physical activity and nutritional status of adolescents with a value ($p = 0.005$) in adolescents at SMP Bandung.

One of the factors that influence the nutritional status of adolescents is physical activity. Physical activity is needed by adolescents to maintain ideal body weight and body fitness (Abdul Monim Batiha, 2018). Physical activity is one of the causes that affect a person's nutritional status. Low physical activity will cause nutritional status to be overweight. The prevalence of overweight is high (12%) among those who do not follow a regular physical activity program (Abdul Monim Batiha, 2018). According to (Condello et al., 2016) the combination of insufficient physical activity and high energy intake is responsible for overweight and obesity. The more active a person is in doing physical activities, the more energy is expended, if excess energy intake is not balanced with balanced physical activity, adolescents are easily overweight (Khasanah, 2016).

In this study, the results showed that the majority of students had moderate physical activity by 56%. Based on the results of the study, from 48 students who had normal nutritional status, 27 students had low, medium and high physical activity. And the majority of respondents' physical activity with overweight nutritional status is low and moderate. There are also some respondents who have high physical activity, this can happen because everyday respondents help their parents in lifting vegetable crops and often play ball in the afternoon. This can happen due to various factors, namely because this research was carried out only within 7 days (1 week) it is possible that during that time it turned out that the student's activity was indeed light or low but in the previous days the activity was moderate or high, or it could be because eating patterns that are less than the respondents so that even though their physical activity is low due to a lack of diet it will cause their nutritional status to become normal.

4. Conclusions

Based on the results of the research that has been described, it can be concluded that the nutritional status of the highest grade VIII SMP Purwajaya students is in the normal category. The highest student's diet is in the good category. And the highest physical activity of students is in the moderate category. And the results showed that there was a significant relationship between diet and the incidence of overweight in adolescents aged 13-15 years at Purwajaya Junior High School with a p value of 0.002 and a correlation coefficient of 0.336. There is also a significant relationship between physical activity and the incidence of overweight in adolescents aged 13-15 years at Purwajaya Junior High School with a p value of 0.000 and a correlation coefficient of -0.554.

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