THE RELATIONSHIP BETWEEN DIET AND PHYSICAL ACTIVITY WITH BODY MASS INDEX (BMI) IN ADOLESCENTS AT SMAN 9 JAKARTA

By
Karyadi[1], Tisya Yulia Sari[2], Edi Gunawan[3], Jamaludin[4]
[1,2]Nursing Science Study Program, Faculty of Health Sciences UIN Syarif Hidayatullah Jakarta
[3,4]Institut Kesehatan Hermina
Email: [1]edigunawan2730@gmail.com

Article History:
Received: 24-02-2025
Revised: 06-03-2025
Accepted: 27-03-2025

Keywords:
Diet, Physical Activity, Body Mass Index, Nutritional Status

Abstract: Background: *Physical activity and diet are one of the factors of nutritional problems that will affect the growth and development of adolescents. In Indonesia, the prevalence of overnutrition and undernutrition in adolescents aged 16-18 years has increased. The role of nurses as educators and implementers of nursing care can improve health status in adolescents.* ***Objective:*** *This study is to determine the relationship between diet and physical activity with body mass index of adolescents at SMAN 9 Jakarta.* ***Methods:*** *This type of research is quantitative with correlation analytic design using cross sectional approach.* ***Results:*** *The results of the study from 102 respondents showed that the majority of body mass index was categorized as healthy weight 60.8%, moderate physical activity 59.8%, and poor diet 50.0%. The results of the Spearman's rho correlation test of dietary variables obtained p value = 0.000 so that p < α then, there is a relationship between diet and body mass index at SMAN 9 Jakarta with a strong closeness value of 0.507 and positive direction. The physical activity variable obtained p value = 0.511 so that p> α then, there is no relationship between physical activity and body mass index at SMAN 9 Jakarta with a very weak 0.066 and positive direction. Diet and physical activity are important to pay attention to in order to achieve a normal body mass index, especially for adolescents.*

INTRODUCTION

Adolescents experience a transition period from childhood to adulthood, resulting in various changes. The World Health Organization (WHO) says that adolescents are those aged between 10 and 19 years old, and adolescents are divided into two groups demographically, the first group is the 10-14 years age group and the second group is the 15-19 years age group. On the other hand, Law No.23 of 2022 on Child Protection categorizes all people under

the age of

18 as "children". Adolescents experience a transition period where they grow physically, experience changes in their eating habits, and their lifestyle impacts their nutritional health (Yusnira & Lestari, 2021).

The current nutrition problem in Indonesia is known as triple burden malnutrition, namely undernutrition, overnutrition, and micronutrient deficiencies (Vani et al., 2023). This problem continues to increase regardless of age group. This problem occurs in urban areas and even rural areas. The impact of this problem affects health, namely undernourished people are at risk of infection, while overnourished people are at risk of various degenerative diseases (Muchtar et al., 2022).

Adolescents aged 13 and 18 years experience rapid growth in terms of physical, cognitive, and psychosocial growth, thus requiring more nutrition. Overweight and obesity are nutritional problems that many adolescents experience. High carbohydrate consumption increases the calorie intake of adolescents. According to Smith, adolescents prefer foods that contain a lot of calories derived from carbohydrates. High carbohydrate consumption encourages greater calorie intake (Yanti et al., 2021).

Overweight is an increase in body weight with a percentage of 10%-15% of normal body weight, while obesity is a condition of more than normal body weight with an excess percentage of more than 20% of normal body weight. According to WHO, overweight and obesity account for 30% of the risk of cancer. In addition to genetic, dietary, environmental, social, and psychological factors, the causes of obesity in adolescents also include lifestyles such as lack of physical activity (Riskawati & , Kania Aviandi Savitri, Putri Raessy Ramdani, 2020). The problem of excess weight must be considered and checked regularly by measuring the body mass index based on body weight and height so that it can be seen that a person's nutritional status is excessive, normal, or malnourished (Lionita et al., 2021).

Based on RISKESDAS in 2018, the prevalence of body mass index (BMI) of adolescents aged ≥15 years in the overweight category showed a percentage of 35.4%, while adolescents in the obesity category showed a percentage of 21.8%. The difference in prevalence based on gender is known that women have more nutritional problems than men, as shown by the percentage of (29.3%) women and (14.5%) men. The prevalence of body mass index is higher in urban areas with a percentage of (25.1%) and (17.8%) in rural areas (Riskesdas, 2018).

Health problems must be addressed immediately so as not to have an impact on non-communicable diseases (NCDs). Efforts to optimize the quality of life of health problems, especially gzi problems in adolescents, are important for community nurses in carrying out their functions as educators and implementers of nursing care. Management that can be given to school children who have nutritional problems can be given at school, which is where they spend their daily time. Identification of problems and management of nutritional problems such as overweight at school can be carried out by nurses through the Coordinated School Health Program approach initiated by Kolbe and Allensworth (CDC, 2014) in Anggraini (2021) monitoring of nutritional problems focuses on health education, physical education, nutrition, counseling, and school involvement as policy makers and providers of health services in the school environment for adolescents (Anggraini et al., 2021).

Nurses also have a role in preventive efforts such as weighing body weight and height, as well as providing drug packages and consumption in improving nutrition. This

management is expected to make overweight and underweight become ideal. The participation of teachers and peers in providing support and monitoring is required. Programs to achieve good nutrition can be carried out by establishing adolescent health cadres (KRR) in the School Health Unit (UKS).

Increased body mass index The World Health Organization (WHO) says that factors that increase the risk of degenerative diseases such as hypertension, cancer, heart disease, and many others. One can maintain their body mass index within the normal range by exercising and eating regularly. Data shows that 33.5% of people over 10 years old do not exercise, an increase from 26.1% (Prisilia & Malinti, 2023). One factor that causes adolescents to become more obese is the amount of time spent in class, most of which is spent sitting.

One of the factors that cause nutritional problems is lazy movement or decreased physical activity. Less physical activity can lead to a decrease in muscle mass and an increase in fat in the body, which has an impact on motor performance including postural balance and muscle strength (Adhi Jaya et al., 2023). Various types of causes of physical disability and death are sedentary lifestyles or lack of exercise. Lack of physical activity can increase the risk of cardiovascular diseases such as hypertension, stroke, and CHD, as well as diabetes and obesity.

In addition, diet is also a factor that causes nutritional problems. People's lifestyles have changed a lot such as preferring to consume foods that contain carbohydrates and fats. If this diet is not balanced with physical activity, it can lead to a body weight that is not ideal.

Adolescents who have nutritional problems will affect cognitive abilities, productivity, and performance. Fast food and junk food when consumed for a long period of time become one of the foods that affect a person's memory, causing memory to decrease (Alif, 2020).

Simple physical activities such as walking, cycling, or gymnastics can help burn calories, reduce the risk of obesity and reduce stress. Regular activity will reduce health costs and improve school performance. In adolescents who want an ideal, slim, and slim body do excessive physical activity and participate in activities that require a lot of body movement (Wahyuningsih & Pratiwi, 2019).

Data from preliminary studies that researchers have conducted on 15 students, it is known that 1 person is underweight, 5 people are healthy weight, 7 people are at risk of overweight, 2 people are overweight. Physical activity carried out by all students is sports lessons once a week for 100 minutes and every Friday doing a leisurely walk for 1 hour. Physical activity carried out by 6 students is participating in extracurricular activities for 1-2 hours. Diet in students who have a body mass index of risk of overweight and overweight as much as 3-4 times a day, students with a body mass index of healthy weight as much as 1-2 times a day, and underweight as much as 1-3x a day. All students consume snacks and junk food every day on average 2 times a day. Supported by food sold in the school canteen, namely meatballs, katsu, warteg rice, rice bowls, yamin noodles, soup dumplings, grilled meatballs, fried sausages, fried brains, packaged drinks, juices, fried foods, and ice cream.

In previous research conducted by Lupiana et al (2022) on adolescents at Adventist Junior High School Bandar Lampung regarding diet and body mass index said that there was a relationship between dietary variables and adolescent body mass index (Lupiana et al.,

2022). According to research conducted by Azhima et al (2023) on adolescents regarding the relationship of eating behavior to body mass index said that there was a relationship between eating behavior variables and body mass index in adolescents (Azhima Rahmatika Sasmi et al., 2023).

Based on the above background, the researcher is interested in conducting research on "The relationship between diet and physical activity with an increase in adolescent Body Mass Index in students at SMAN 9 Jakarta".

LITERATURE REVIEW

Definition of Adolescence

According to Jhon W. Santrock (2002) in Khadijah (2020) Adolescence is a development between childhood and adulthood that includes biological, cognitive, and social-emotional changes. Furthermore, in (Khadijah, 2020) also explained that Hurlock (2003) revealed that psychologically the Adolescent phase is the age at which a person adapts to adult society, they no longer feel below the level of their elders, but feel equal (Khadijah, 2020).

Characteristics of Adolescents

Adolescents grow towards adulthood including physical, emotional, and social maturity. In the transition phase they have certain characteristics that distinguish them from changes in other age ranges. The following are physical, emotional, and social changes that occur in adolescents, namely: (Hurlock, 2003).

a. Physical changes

In adolescence physical changes will definitely occur. Physical changes consist of external and internal changes.

1) External changes

a) Height The difference in height change is faster in girls at seventeen and eighteen, and boys a year later. at seventeen and eighteen, and boys a year later

b) Weight weight changes follow the timing of height changes. But weight is now spread to parts of the body that previously contained little or no fat.

c) Body Proportions various limbs will widen and lengthen so that the limbs do not look too long.

d) Sex Organs in adolescence the female and male sex organs reach a mature size in late adolescence. mature in late adolescence, but their functions do not mature until a few years later.

2) Internal changes

a) Digestive System the stomach becomes longer, the intestines get longer and bigger, the muscles in the stomach

b) Respiratory System capacity in the lungs of girls faster than boys, at age seventeen and boys in later years.

b. Emotional changes

Physical and glandular changes cause emotional changes in adolescents. Fourteen-year-old adolescents are more irritable, have uncontrollable emotional tendencies, and do not try to control their feelings. As a result, the storms and stresses that occur during this period diminish towards the end of early

ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)

adolescence. One way to control emotions is to discuss your personal problems with others. Openness, feelings, and personal problems are influenced by a sense of security in social relationships and, in part, the degree of favorability of the "target person".

c. Changes in social behavior
The associations of childhood slowly begin to change. There is a change in interest from tiring and sweaty play to more formal and less sweaty social activities. Groupings in boys tend to be larger and less close compared to girls who have fewer and more defined friends.

Formula for Calculating BMI

In measuring height, it is rarely recorded in meters, so meters are converted to centimeters by multiplying meters by 100. After that, divide the body weight by centimeters squared. This is the same as dividing body weight (kilogram) by the square of height in centimeters and then multiplying by 10,000, as in the IMT formula as follows (CDC 2000) in (Wahyuni, 2022).

$$\text{IMT} = [BB\ (kg)/TB\ (cm)/\ TB\ (cm)]x\ 10.000$$

BB = Body Weight (kg) TB = Body Height (cm)

Table 1 BMI 2-20 Years Percentile CDC 2000 and intestinal walls get thicker and liver gets heavier and the esophagus gets longer

Nutrition Catagory	**Status Presentile Threshold**
Underweight	<5 percentile
Healthy Weight	5 percentile to <85 percentile
Risk of Overweight	85 percentile to 94 percentile
Overweight	>95 percentile

Nutritional Problems

Undernutrition is a condition due to insufficient intake, so that the use of calories over a certain period of time is insufficient. Nutrition problems include the following:

1. Overweight, Excessive body weight caused by excessive accumulation of body fat is called overweight. Irregular eating patterns are usually caused by the many instant food choices available anywhere and anytime (Larasita & Nelyahardi, 2022).
2. Obesity, Obesity is overweight as a result of excessive body fat accumulation. The ratio between body fat and body weight is about 25-30% in women and 18-23% in men (Retno & Murdijati, 2014).

3. Iron nutritional anemia, causes iron nutritional anemia (AGB) if the food consumed does not meet the recommended nutritional adequacy of iron. AGB causes a decrease in physical ability or work productivity, a decrease in thinking ability and a decrease in antibodies so that it is susceptible to infection. Management is done through giving iron tablets or syrup to patients.

Factors that cause overnutrition

1. Socio-economic, increased income leads to increased purchasing power for food, increased purchasing power for food, increased provision of food and increased consumption.
2. Level of education and knowledge, people who have sufficient knowledge about the function of food for the health of the body, will tend to be selective in consuming food both for themselves and their families. Eating patterns and behavior, the existence of demographic
3. transition makes changes in life-style and eating patterns of the community from traditional patterns to western eating patterns that contain high calories, high fat, low fiber. Research results in several countries in America, Europe, and Asia show that consumption of ready-to-eat foods has increased in recent decades. Unbalanced eating behavior leads to a state of overnutrition that will have an impact on health, especially generative diseases.
4. Alcohol consumption, The energy content of alcoholic beverages contains
5. 7.1 cal/gram of energy. If alcohol is consumed in large quantities, the energy contribution is increasing. In cases of obesity, the alcohol content is used as a substitute for energy, thus increasing the amount of calorie intake in the body. A person who consumes alcohol will experience the effects of hyperphagia (eating a lot) accompanied by other accompanying foods with high fat content.
6. Physical Activity, the second risk factor for obesity in the community is sedentary activity. They sit more while working around them equipped with facilities. In Mexico, it was shown that there was an increase in BMI and prevalence of obesity, both in women and men who had low physical activity (Arisman, 2004).

Types of Physical Activity

In Kusumo (2020) There are three types of physical activity based on the intensity and amount of calories used, namely:

1. Heavy physical activity, categorized as heavy physical activity when during activity the body sweats profusely, heart rate, and breathing frequency increases to panting. The energy expended in this category is >7 kcal/minute.
2. Moderate physical activity, categorized as moderate physical activity when the body sweats slightly, heart rate and breathing frequency become faster. The energy expended is 3.5-7 kcal/minute.
3. Light physical activity, categorized as light physical activity because activities that require little energy and usually do not cause changes in breathing, the energy expended is <3.5 kcal/minute. (Kusumo, 2020)

The same procedure was carried out for moderate-intensity activities and vigorous-intensity activities. The following values were used for IPAQ data analysis: walking =

3.3 METs, moderate activity = 4.0 METs and vigorous activity = 8.0 METs. These values

ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)

can be used to calculate the MET minutes/week score using the following formula: (International Physical Activity Questionnaire, 2005).

1. Walking MET minutes/week = 3.3 x time (minutes) x days
2. Moderate activity MET minutes/week = 4.0 x time (minutes) x days
3. Vigorous activity MET minutes/week = 8.0 x time (minutes) x day 3.

Total physical activity MET minutes/week = sum of walking score + moderate activity + vigorous activity MET minutes/week

Healthy Diet

A healthy diet is consuming a balanced diet with a variety of nutrients in sufficient quantities (Hasibuan, T. H. P., M.Siagian, 2020). Adequate consumption will result in good nutritional health. A balanced diet is when consuming food according to needs accompanied by the selection of the right food ingredients will affect good nutritional status. If food intake does not meet the needs such as excess food intake, it will cause excess weight and other diseases caused by excess nutrients. Conversely, if food intake is insufficient, it will cause the body to be thin and susceptible to disease. This is called malnutrition.

RESULT

Univariate Analysis

Table 2 Frequency Distribution Based on Characteristics (Age and Gender) at SMAN 9 Jakarta (n=102)

Characteristics	Result		
Age (Years)	Mean ± SD	16,45 ± 0.779	
	Min-Max	15 - 18	
	95% CI	16.30 – 16.60	
Characteristic		**Frequency**	
		N	**%**
Gender	Male	44	43,1%
	Female	58	56,9%

Table 2 shows that out of 102 respondents, the average age of people is 16.45 (95% CI: 16.30-16.60) with a standard deviation of 0.779. The lowest age value was 15 and the highest was 18. The majority were female as many as 58 people (56.9%).

Table 3 Frequency Distribution Based on Characteristic (Body Mass Index, Diet, and Physical Activity) at SMAN 9 Jakarta (n=102)

Characteristic	Result	
Body Mass Index	Mean ± SD	1,44 ± 0,725
	Min-Max	0 - 3

	95% CI	1,30 – 1,58
Diet	Mean ± SD	0,64 ± 0,715
	Min-Max	0 – 2
	95% CI	0,50 – 0,78
Physical Activity	Mean ± SD	1,01 ± 0,637
	Min-Max	0 – 2
	95% CI	0,88 – 1,13

Table 4 Distribution of the Relationship between Diet and Body Mass Index (BMI) in Adolescents at SMAN 9 Jakarta (n=102)

Characteristic		**Frequency**	
		N	**%**
Body Mass Index	*Underweight*	3	2,9 %
	Healthy weight	62	60,8%
	Risk of overweight	26	25,5%
	Overweight	11	10,8%
Diet	Less	51	50,0%
	Simply	37	36,3%
	More	14	13,7%
Physical Activity	Low	20	19,6 %
	Moderate	61	59,8 %
	High	21	20,6 %

ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)

Diet	Body Mass Index									
	Under weight		*Healthy weight*		*Risk Of Over weight*		*Over weight*		*Total*	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Less	2	3,9	42	82,4	6	11,8	1	2,0	51	**100**
Simply	1	2,7	18	48,6	11	29,7	7	18,9	37	**100**
More	0	0,0	2	14,3	9	64,3	3	21,4	14	**100**
Total	**3**	**2,9**	**62**	**60**	**26**	**25,5**	**11**	**10,8**	**102**	**100**
P value					0,000					
r					0,507					

Table 3 shows that out of 102 respondents, the average body mass index of respondents was 1.44 (95% CI: 1.30 - 1.58) with a standard deviation of 0.725. The lowest body mass index value was 0 and the highest was 3. The majority of adolescent respondents at SMAN 9 Jakarta were healthy weight as many as 62 people (60.8%). the average diet of respondents was 0.64 (95% CI: 0.50 - 0.78) with a standard deviation of 0.715. The lowest physical activity value was 0 and the highest was 2. the majority of teenage respondents at SMAN 9 Jakarta had a poor diet as many as 51 respondents with a percentage of (50.0%). And the average physical activity of respondents was 1.01 (95% CI: 0.88 - 1.13) with a standard deviation of 0.637. The lowest physical activity value was 0 and the highest was 2. The majority of adolescent respondents at SMAN 9 Jakarta were moderate physical activity as many as 61 respondents with a percentage of (59.8%).

Bivariate Analysis

Table 4 shows that out of 102 students, it can be seen that the results of the relationship test between the dietary pattern variable and body mass index can be said to be significant where the p value is 0.000 (p value <0.05). So it can be concluded that there is a relationship between diet and body mass index in adolescents at SMAN 9 Jakarta. The strength of the relationship between diet and body mass index is in the strong category and the direction of the relationship between the variables is unidirectional.

Table 5 Distribution of the Relationship between Physical Activity and Body Mass Index (BMI) in Adolescents at SMAN 9 Jakarta (n=102)

Physical Activity	Body Mass Index									
	Under weight		*Healthy weight*		*Risk Of Over weight*		*Over weight*		*Total*	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Low	2	10,0	13	65,0	4	20,0	1	5,0	20	**100**
Moderate	1	1,6	34	55,7	18	29,5	8	13,1	61	**100**
High	0	0,0	15	71,4	4	19,0	2	9,5	21	**100**
Total	**3**	**2,9**	**62**	**60,8**	**26**	**25,5**	**11**	**10,8**	**102**	**100**
P value					0,511					
r					0,507					

Table 5 shows that out of 102 students, it can be seen that the results of the relationship test between the physical activity variable and body mass index can be said that it is not significant where the sig value (2-tailed) is 0.511 (r> 0.05).

So it can be concluded that there is no relationship between physical activity and body mass index in adolescents at SMAN 9 Jakarta. The strength of the relationship between physical activity and body mass index is in the very weak category and the direction of the relationship between the variables is unidirectional.

DISCUSSION

Overview of Characteristics by Age

In the research conducted at SMAN 9 Jakarta, the majority were 16 years old because at this age adolescents are very concerned about their body shape and do things that make their body shape ideal such as changing their diet. At this age they need special attention because they need to adjust to physical changes, eating habits, and lifestyles, which will certainly cause some problems such as problems with nutritional health. Unlike the ages of 17 and 18 who are about to enter the adult period, they already have intellectual stability, their egos are looking for new experiences, and the formation of a sexual identity that will not change anymore.

Physical changes, especially sexual organs, affect the development of emotions or feelings such as love, longing, and the desire to get to know the opposite sex more intimately. One of the psychological aspects of physical changes in this transition period is to make adolescents pay more attention to the body and build their own image of how others perceive them (Dieny, 2014).

Overview of Characteristic Based on Gender

Adolescents experience rapid growth in terms of physical, cognitive and psychosocial growth. At this stage adolescents prefer to listen to the words of their peers rather than parents or other adults. Experimenting, such as choosing to become a vegetarian, and creating a body image. In this study, the majority of researchers assumed that adolescent girls experience faster growth and development than boys. In addition, the population in the research location is mostly occupied by women. So that the highest risk of nutritional problems is found in adolescent girls compared to adolescent boys. This study is in line with research Setyorini dan Lieskusumastuti (2020) saying that female adolescents pay more attention to their body shape compared to men (Setyorini & Lieskusumastuti, 2020).

This description shows that the theory and previous research are in line with the results of the assessment of the majority female population conducted by researchers. In the process, researchers did not analyze between gender factors and body mass index in adolescents.

Body Mass Index Overview

Nutritional status is the state of health of a person's body that results from the consumption, absorption, and use of food nutrients in the body. Assessing whether a person is healthy or does not suffer from diseases due to nutritional disorders, both mentally and physically, is an important factor in assessing nutritional status. The nutritional status of adolescents is a state in which the fulfillment of nutritional needs, namely the balance between consumption and absorption of nutrients.

The results of the study at SMAN 9 Jakarta showed that the majority of healthy weight body mass index were female 38 out of

102 respondents with a percentage (66%) compared to 24 respondents (24%). This occurs because female adolescents have narcistic tendencies, namely loving themselves,

ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)

conducting experiments such as choosing to become vegetarians, and creating body image. This influences her diet so that she can achieve an ideal body. In addition, at school there are sports activities for students who have abilities or interests in sports such as extracurricular basketball, futsal, martial arts, and others.

Research conducted Merita (2020) states that normal nutritional status plays a role in realizing reproductive health that will help adolescents achieve optimal growth and development (Merita et al., 2020). Good nutritional status in adolescence is very important so that when they are in the adult phase later through pregnancy it is not at risk. Women whose height is less than 145 cm are at risk of having difficulty during childbirth. Meanwhile, mothers who weigh <45 kg tend to give birth early (premature) and child development disorders.

However, there are still body mass index results of students in the underweight, risk of overweight, and overweight nutrition categories. This is a problem that needs attention. Nutritional problems will have a negative impact on health. Undernutrition will make a person susceptible to infection. Meanwhile, the impact of overnutrition is seen in the increase of degenerative diseases, such as coronary heart disease, diabetes mellitus, hypertension, and liver disease.

Diet Overview

Energy is one of the products of carbohydrate, protein, and fat metabolism as power for body metabolism, growth, temperature regulation, and physical activity. Males and females have different energy needs due to differences in body composition and growth rate. Adolescence between the ages of 13 and 18 years requires adjustment to physical changes, eating habits, and lifestyle, so adequate energy intake is needed.

Dietary patterns in students who are not on a diet and have a healthyweight body mass index tend to consume the same type of food every day. After recalling 3x24 hours every day students consume fried rice with eggs at breakfast, replace rice with bread, do not eat double carbohydrates, eat 2-3x a day and some students do not eat breakfast or dinner. In addition, students said they were on a diet that only consumed boiled foods such as boiled carrots, boiled broccoli, and other vegetables cooked by boiling, side dishes cooked without oil by airfrying, consuming fruit as a distraction, and the frequency of eating 3x a day without dinner or night snacks. Other students said that they were lazy to eat because they were lazy to chew after a 3x24 hour recall had a poor diet, only consuming milk twice a day as breakfast and dinner, eating heavy meals only once a day, and eating interludes only consuming sweet drinks such as thaitea. Students who have a body mass index risk of overweight and overweight after 3x 24 hours recall consume double carbohydrates, eat 3 times a day and eat at intervals or snacks, consume junkfood such as pizza and kebabs, drink sweet drinks that have a high sugar content such as lemon tea, and iced tea.

Physical Activity Overview

The results of the frequency distribution of respondents of SMAN 9 Jakarta students based on physical activity found that 61 out of 102 respondents did moderate physical activity with a percentage (59.8%), followed by High physical activity 21 respondents (20.6%) and low activity as many as 20 people (19.6%). This is based on the measurement of the international physical activity questionnaire (IPAQ). These results show that the majority of students at SMAN 9 Jakarta have moderate physical activity and High activity.

In the results of this study, physical activity in the moderate and high categories is due to the respondents' daily activities at school doing physical activity activities in sports lessons, scouts, and additional activities every Friday such as leisurely walks or gymnastics and after finishing school hours they do other activities such as extracurricular activities such as basketball, martial arts, paskibra, saman dance, etc. Arriving at home they help to do the work on the house. Arriving home they help with homework. However, there are still some students in the low physical activity category because their activities are more at school just sitting, going home from school riding a vehicle, and arriving home is used to relax without doing homework. Based on the 2018 Riskesdas, the prevalence of data on insufficient physical activity increased in the population aged ≥ 10 years from 26.1% to 33.5% and 0.8%. (Prisilia & Malinti, 2023).

The process of burning energy occurs when doing physical activity, so if adolescents do high physical activity, the more energy is used. Physical activity can burn fat and calories according to the physical activity performed (Zurrahmi et al., 2024). If someone does low category physical activity, the fat and calorie content in the body will accumulate without any combustion process. Vice versa, if someone does moderate and heavy activity, the content of fat and calories will occur the combustion process in the body. Physical activity is one of the factors of overnutrition but there are other factors that can cause overnutrition such as genetics, habits given when still a baby by parents or caregivers, namely formula milk, excess hunger hormones and leptin resistance as well, lack of knowledge, and consuming junk food.

Relationship between Diet and Body Mass Index (BMI) in Adolescents at SMAN 9 Jakarta

Spearman's rho results analyzed using SPSS obtained a positive relationship between diet and body mass index in adolescents at SMAN 9 Jakarta with a p value of 0.000 ($p < 0.05$). The results showed that the majority of adolescent respondents at SMAN 9 Jakarta had a poor diet of 50.0% and a healthyweight body mass index of 60.8%. The strength of the relationship between diet and body mass index is in the strong category (correlation coefficient = 0.507).

The results of this study are in line with the research of Indrasari & Sutikno (2020) to see the relationship between energy consumption and nutritional status, the results showed that there was a relationship between energy consumption and nutritional status. P-value (0.000) is less than the α value (0.05). The nutritional status of adolescents will be influenced by their energy needs. Daily meals, as well as snacks in the canteen and outside school, provide energy (Indrasari & Sutikno, 2020).

Research that has been conducted shows that the diet of students who skip breakfast, diet, lazy eating, often consume snacks, consume few vegetables, high consumption of carbohydrates and junk food causes unfulfilled energy intake according to daily needs. This is because the intensity of eating, the variety of food, and the amount of food consumed affect the body mass index (Multazami, 2022).

Students in this study often consume foods with high calories such as junk food and instant food but low meal frequency. In one day they ate instant noodles but after that they did not consume anything else, and vice versa if they consumed healthy foods with a frequency of three times a day but they did not consume junk food or other instant foods at the same time. In this case there are still students who have a body mass index risk of overweight and overweight with a diet that likes to consume junk food and instant food, high

ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)

in carbohydrates and a frequency of eating more than 3 times a day along with snacks.

Relationship between Physical Activity and Body Mass Index (BMI) in Adolescents at SMAN 9 Jakarta

Spearman's rho results analyzed using SPSS found no relationship between physical activity and body mass index in adolescents at SMAN 9 Jakarta with p value 0.511 (p > 0.05). The results showed that the majority of adolescents respondents at SMAN 9 Jakarta were the majority of adolescents respondents at SMAN 9 Jakarta were moderate physical activity 59.8%. And healthyweight body mass index 60.8%. The strength of the relationship between physical activity and body mass index is in the very weak category (correlation coefficient = 0.066).

The results of this study are in line with the research of Astuti, et al (2022). The results showed underweight nutritional status as much as 48%, diet as much as 48% of the less category, and moderate physical activity as much as 52%. The Pearson Chi-square value of 0.311 shows a value> 0.05 which means there is no relationship between body mass index and physical activity of SMA Negeri 1 Indralaya students (Astuti et al., 2022). This study was strengthened by the research of Mokoagow & Munthe (2020) the results showed normal nutritional status as much as 76.66% and the intensity of light and moderate physical activity as much as 43.33%. This shows that there is no relationship between physical activity and nutritional status. In this study, adolescents had a healthy weight body mass index with moderate physical activity but a poor diet (Mokoagow & Munthe, 2020).

Students who have a low activity category do not do other activities besides school and relax at home. To maintain health and prevent weight gain, it is recommended to do daily physical activity accompanied by moderate physical exercise for 60 minutes once a week or for 20-30 minutes with a frequency of 3 times a week in the form of brisk walking and jogging or also by doing aerobic exercises 20-30 minutes with a frequency of 2-3 times a week. Compared to the physical activity done at school during the week which is 160 minutes.

Adolescents who have a healthy weight body mass index tend to have a good level of physical activity. Conversely, if the BMI is not good, the level of physical activity is also low. The results of this study are reinforced by research by Aulianti & Puspitasari (2021) which states that physical activity and nutritional status have a negative correlation where the lower the intensity of physical activity, the higher the nutritional status value and vice versa if the higher the intensity of physical activity, the lower the nutritional status value (Aulianti & Puspitasari, 2021).

LIMITATIONS OF THE STUDY

1. This study was not conducted in depth regarding other factors that were assessed in influencing diet such as fat intake, protein intake, and carbohydrate intake.
2. This study was not conducted in depth regarding other factors assessed in influencing physical activity such as sedentary lifestyle in respondents.
3. Limited data sources related to the weight and height of respondents recorded at school.
4. Limited time researchers only took one day without giving the opportunity to repeat the next day.
5. The limited ability of researchers in determining the sample should be all data

on students in grades X, XI studied without elimination.

CONCLUSION

1. Based on the characteristics of students of SMAN 9 Jakarta, it is known that the majority of 56.9% are female and the remaining 43.1% are male with an age range of 15-18 years.
2. Based on body mass index, most students have normal BMI or healthy weight as much as 60.8%, risk of overweight as much as 25.5%, overweight as much as 10.8% and underweight as much as 2.9%.
3. Based on physical activity physical activity, most students do moderate physical activity as much as 59.8%, high physical activity 20.6% and low activity as much as 19.6%.
4. Based on diet, most students have an underweight diet as much as 50.0%, adequate diet as much as 36.3% and more diet as much as 13.7%.
5. Based on the results of the research conducted, it was concluded that there was no relationship between physical activity and body mass index in adolescents at SMAN 9 Jakarta.
6. Based on the results of the research conducted, it is concluded that there is a relationship between diet and body mass index in adolescents at SMAN 9 Jakarta.

SUGGESTIONS

1. For Students

a. Students are expected to be able to maintain a normal body mass index based on ideal body weight by paying attention to diet, namely energy intake so that regular monitoring is needed.

b. Students are expected to be able to increase the intensity of physical activity and implement a healthy lifestyle in everyday life to support a normal body mass index.

2. For Schools

a. Schools are expected to provide support and monitoring of students related to body mass index by providing physical activity containers.

b. Schools are expected to activate the program to achieve good nutrition by forming adolescent health cadres (KRR) in the School Health Business (UKS).

3. For Educational Institutions and Nursing Profession

a. Educational institutions are expected to conduct health education related to knowledge of the importance of healthy lifestyles such as diet and physical activity in students who have nutritional problems and those who do not have nutritional problems to maintain their health.

b. The nursing profession is expected to conduct health screening at school so that the body mass index of adolescents is well controlled.

4. For future researchers

a. Future researchers are expected to conduct more in-depth research related to other factors that are considered to be able to improve the quality of education.

b. Further researchers are expected to be able to conduct research with a longer time not only one day of research.

ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)

c. Further researchers are expected to be able to conduct broader research not only on some X and XI grade students but on the entire population of adolescents at school.
d. Future researchers are expected to conduct research with the same variables but with different questionnaires and methods such as seeing the effect of independent variables on the dependent variable.

REFERENCES

[1] Adhi Jaya, Putu Dedy Arjita, I., & Kedokteran, F. (2023). The Relationship of Body Mass Index (BMI) and Waist Circumference with Arm Muscle Strength in Students of the Faculty Of Medicine, Al-Azhar Islamic University Mataram. Nusantara Hasana Journal, 2(10), Page.
[2] Alif, S. (2020). Analisis Dampak Konsumsi Jajanan, Aktifitas Fisik, Dan Status Gizi Terhadap Prestasi Belajar Siswa Di Smk Swasta Pharmaca Medan. Jurnal Komunitas Kesehatan Masyarakat, 1(2), 31–39. https://doi.org/10.36090/jkkm.v1i2.576
[3] Anggraini, N., Mulyono, S., & Fitriyani, P. (2021). Peran kader kesehatan remaja dalam mengurangi risiko kelebihan berat badan di kalangan remaja SMP Jakarta. Journal of Health, Education and Literacy (J-Health), 4(1), 40–49. https://ojs.unsulbar.ac.id/index.php/j- healt/article/view/1019
[4] Arisman. (2004). GIZI DALAM DAUR KEHIDUPAN: BUKU AJAR ILMU GIZI. EGC.
[5] Astuti, N. P. T., Bayu, W. I., & Destriana, D. (2022). Indeks massa tubuh, pola makan, dan aktivitas fisik: apakah saling berhubungan? Jurnal Olahraga Pendidikan Indonesia (JOPI), 1(2), 154–167. https://doi.org/10.54284/jopi.v1i2.99
[6] Aulianti, T., & Puspitasari, R. (2021). Hubungan Antara Tingkat Stres Dan Akitivitas Fisik Dengan Status Gizi Pada Usia Remaja Di Tangerang. Alauddin Scientific Journal of Nursing, 2(1), 24–31. https://doi.org/10.24252/asjn.v1i2.20311
[7] Azhima Rahmatika Sasmi, Riri Novayelinda, & Rismadefi Woferst. (2023). Hubungan Perilaku Makan Terhadap Imt (Indeks Massa Tubuh) Pada Remaja. Jurnal Ilmu Kedokteran Dan Kesehatan Indonesia, 3(1), 28–40. https://doi.org/10.55606/jikki.v3i1.1011
[8] Dieny. (2014). PERMASALAHAN GIZI REMAJA PUTRI. Graha Ilmu Fitriah.
[9] Hasibuan, T. H. P., M.Siagian, E. E. S. (2020). Hubungan Pola Makan Dengan Status Gizi Pada Balita. Jurnal Kebidanan Kestra, 2.
[10] Hurlock, E. B. (2003). PSIKOLOGI PERKEMBANGAN SUATU PENDEKATAN SEPANJANG RENTANG KEHIDUPAN (edisi keli). Erlangga.
[11] Alif, S. (2020). Analisis Dampak Konsumsi Jajanan, Aktifitas Fisik, Dan Status Gizi Terhadap Prestasi Belajar Siswa Di Smk Swasta Pharmaca Medan. Jurnal Komunitas Kesehatan Masyarakat, 1(2), 31–39. https://doi.org/10.36090/jkkm.v1i2.576
[12] Anggraini, N., Mulyono, S., & Fitriyani, P. (2021). Peran kader kesehatan remaja dalam mengurangi risiko kelebihan berat badan di kalangan remaja SMP Jakarta. Journal of

Health, Education and Literacy (J-Health), 4(1), 40–49. https://ojs.unsulbar.ac.id/index.php/j- healt/article/view/1019
[13] Arisman. (2004). GIZI DALAM DAUR KEHIDUPAN: BUKU AJAR ILMU GIZI. EGC.
[14] Astuti, N. P. T., Bayu, W. I., & Destriana, D. (2022). Indeks massa tubuh, pola makan, dan aktivitas fisik: apakah saling berhubungan? Jurnal Olahraga Pendidikan Indonesia (JOPI), 1(2), 154–167. https://doi.org/10.54284/jopi.v1i2.99
[15] Aulianti, T., & Puspitasari, R. (2021). Hubungan Antara Tingkat Stres Dan Akitivitas Fisik Dengan Status Gizi Pada Usia Remaja Di Tangerang. Alauddin Scientific Journal of Nursing, 2(1), 24–31. https://doi.org/10.24252/asjn.v1i2.20311
[16] Azhima Rahmatika Sasmi, Riri Novayelinda, & Rismadefi Woferst. (2023). Hubungan Perilaku Makan Terhadap Imt (Indeks Massa Tubuh) Pada Remaja. Jurnal Ilmu Kedokteran Dan Kesehatan Indonesia, 3(1), 28–40. https://doi.org/10.55606/jikki.v3i1.1011
[17] Dieny. (2014). PERMASALAHAN GIZI REMAJA PUTRI. Graha Ilmu Fitriah.
[18] Hasibuan, T. H. P., M.Siagian, E. E. S. (2020). Hubungan Pola Makan Dengan Status Gizi Pada Balita. Jurnal Kebidanan Kestra, 2.
[19] Hurlock, E. B. (2003). PSIKOLOGI PERKEMBANGAN SUATU PENDEKATAN SEPANJANG RENTANG KEHIDUPAN (edisi keli). Erlangga. Jambi. Journal of Nutrition College, 9(2), 81–86. https://doi.org/10.14710/jnc.v9i2.24603
[20] Mokoagow, A., & Munthe, D. P. (2020). Hubungan Aktivitas Fisik Dengan Status Gizi Di Smp Nasional Mogoyunggung the Relationship Between Physical Activity and Nutritional Status in Mogoyunggung National Middle School. Jurnal Ilmu Kesehatan Olahraga, 1(1), 20–24.
[21] Muchtar, F., Sabrin, S., Effendy, D. S., Lestari, H., & Bahar, H. (2022). Pengukuran status gizi remaja putri sebagai upaya pencegahan masalah gizi di Desa Mekar Kecamatan Soropia Kabupaten Konawe. Abdi Masyarakat, 4(1), 43–48. https://doi.org/10.58258/abdi.v4i1.3782
[22] Multazami, L. P. (2022). Hubungan Stres, Pola Makan, dan Aktivitas Fisik dengan Status Gizi Mahasiswa. Nutrizione: Nutrition Research And Development Journal, 2(1), 1–9. https://doi.org/10.15294/nutrizione.v2i1.52 293
[23] Prisilia, U., & Malinti, E. (2023). Hubungan Aktivitas Fisik dan Pola Makan dengan Indeks Massa Tubuh Mahasiswa Keperawatan. Journal of Telenursing (JOTING), 5(2), 2205–2212. https://doi.org/10.31539/joting.v5i2.7390
[24] Retno, I., & Murdijati, G. (2014). PENDIDIKAN KONSUMSI PANGAN: Aspek Pengolahan dan Keamanan (pertama). kencana.
[25] Riskawati, Y. K., & , Kania Aviandi Savitri, Putri Raessy Ramdani, A. F. M. (2020). HUBUNGAN TINGKAT AKTIVITAS FISIK DENGAN INDEKS MASSA TUBUH MAHASISWA PROGRAM STUDI SARJANA KEDOKTERAN FAKULTAS KEDOKTERAN UNIVERSITAS BRAWIJAYA.

ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)

[26] Riskesdas. (2018). LAPORAN NASIONAL RISKESDAS 2018. http://www.depkes.go.id/resources/downlo ad/infoterkini/materi_rakorpop_2018/Hasil Riskesdas 2018.pdf
[27] Setyorini, C., & Lieskusumastuti, A. D. (2020). Gizi pada remaja merupakan suatu hal yang harus diperhatikan, banyak dampak yang akan dialami oleh remaja ketika mengalami malnutrisi. Avicenna : Journal of Health Research, Vol 3 No 1, 3(1), 141–148.
[28] Vani, A. T., Triansyah, I., Dewi, N. P., Abdullah, D., & Annisa, M. (2023). Edukasi Dan Pelatihan Penilaian Status Gizi Pada Remaja Di Smp Yari Kota Padang. Nusantara Hasana Journal, 2(8), 290–300.
[29] Wahyuni, N. S. (2022). Indeks Massa Tubuh Remaja.
[30] Wahyuningsih, R., & Pratiwi, I. G. (2019). Hubungan aktifitas fisik dengan kejadian kegemukan pada remaja di Jurusan Gizi Politeknik Kesehatan Mataram. AcTion: Aceh Nutrition Journal, 4(2), 163. https://doi.org/10.30867/action.v4i2.180
[31] Widnatusifah, E., Battung, S., Bahar, B., Jafar, N., & Amalia, M. (2020). Gambaran Asupan Zat Gizi Dan Status Gizi Remaja Pengungsian Petobo Kota Palu. Jurnal Gizi Masyarakat Indonesia: The Journal of Indonesian Community Nutrition, 9(1), 17–29. https://doi.org/10.30597/jgmi.v9i1.10155
[32] Yanti, R., Nova, M., & Rahmi, A. (2021). Asupan Energi, Asupan Lemak, Aktivitas Fisik Dan Pengetahuan, Berhubungan dengan Gizi Lebih pada Remaja SMA. JURNAL KESEHATAN PERINTIS (Perintis's Health Journal), 8(1), 45–53. https://doi.org/10.33653/jkp.v8i1.592
[33] Yusnira, Y., & Lestari, M. (2021). Hubungan Asupan Energi, Kualitas Tidur, Dan Aktifitas Fisik Dengan Kejadian Overweight di SMKN 1 Bangkinang. Jurnal Pendidikan Tambusai, 5(3), 5723–5736.
[34] Zurrahmi, Sudiarti, P. E., Lestari, R. R., & Yuristin, D. (2024). Hubungan Mengkonsumsi Makanan Cepat Saji (Fast Food) Dan Aktifitas Fisik Dengan Kejadian Obesitas Pada Remaja Di Wilayah Kecamatan Bangkinang Kota. Jurnal Ners Universitas Pahlawan, 8(23), 159–166.

THIS PAGE IS INTENTIONALLY LEFT BLANK

ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)