The relationship of physical activity and diet with obesity in State Junior High School 4 students in Malang City

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**Abstract:** Obesity is caused when calorie intake is greater than calories burned, causing the body to store unused calories in the form of fat. Physical activity is body movement caused by muscles. while diet is an attempt to regulate the amount and type of food. So the purpose of this study is to identify the correlation between physical activity and eating patterns with obesity in students of State Junior High School 4 Malang City. This study used a quantitative method, namely measuring height and weight in order to obtain a body mass index as a guideline for obesity classification. To find out the physical activity of the research respondents used the PAQ-A questionnaire, while eating patterns were assisted by a 24-hour Food Recall questionnaire. The sample in this study were 20 respondents who were obese at State Junior High School 4 Malang City. The results of the data analysis using the sperm correlation test showed that there was a significant relationship between physical activity (X1) and obesity (Y), namely Y = -047+021. There is a significant relationship between diet (X2) and obesity (Y), namely Y = 261+042. The results of multiple regression analysis showed that there was a significant relationship between physical activity and obesity, namely $Y = 37.722 - 0.191 (X1) + 0.007 (X2)$. obesity variable of 0.007. Based on the t test, it was obtained tcount of physical activity of 675 and eating pattern of 167 with sig. <0.05, therefore reject H0 with the conclusion that physical activity variables and eating patterns have an effect.

Keywords: obesity, physical activity, diet.
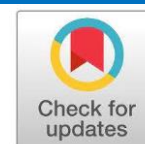
INTRODUCTION

Changes in lifestyle from a conventional lifestyle to a sedentary lifestyle increase the chances of experiencing obesity. A sedentary lifestyle (lack of physical activity) is coupled with an excessive diet, namely consuming high fats, proteins and carbohydrates and a lack of fiber. All the above indicators can exacerbate the risk of obesity. Today, the development of science and technology has a big impact on oneself and the surrounding environment. For example, the negative influence of science and technology progress is the rise of machines or robots that replace human activities, resulting in a decrease in human movement and physical fitness levels (Nurcahyo, 2011). Increased affluence is generally accompanied by changes in lifestyle and eating habits. The urban diet has shifted from the traditional diet rich in vegetables, fiber, and carbohydrates. Someone who often eats restaurant food or eats fast food and eats food sold by the school canteen which provides food that contains a lot of fat and energy, but is low in minerals, vitamins, and fiber (Effendy et al., 2018). The accumulation of energy and nutrition in the body for a long period of time can also lead to obesity (Sartika, 2011).

Obesity is total fat in obesity which can occur if consumption of food and calories exceeds the body's needs for metabolism, physical activity, and body development and growth (Firdaningrum, 2020). According to Basic Health Research (RISKESDAS 2018), in Indonesia the prevalence of obesity aged 13-15 is 5.3% for males and 4.3% for females. In East Java, obese adolescents aged 13-15 years have a prevalence of 13.3% and 11.3% and 11.3% for ages 16-18 years (Setiawati et al., 2019). Meanwhile, the prevalence of obesity in children in Malang is 24.2% (Sahrial, 2015). Obese children are often lazy to do activities and prefer activities that don't require a lot of energy, so they don't get tired easily. Thus, obese children will be more at risk of a sedentary lifestyle, namely a lifestyle that moves a little. Most of the time is spent sitting without physical activity (Maharani et al., 2020).

Obesity is not only a problem of eating a lot, but also a lack of physical activity (Batara et al., 2016). Physical activity consists of all body movements from small movements to fast and heavy movements. Light physical activity results in little energy excretion which later results in inequality between energy input that is greater than the energy expended. The impact of lowering the energy released by the body, so that the rest of this energy will be stored in the form of fat and later become obese (Kurniagustina, 2018). According to research conducted by Khotimah et al. (2019) 55.2% of adolescents with mild physical activity are obese, while 72.7% of adolescents with moderate physical activity are overweight. Statistical results show that there is a significant relationship between physical activity and adolescent BMI. This condition indicates that light physical activity in adolescents has 3.3 times the chance that adolescents will experience obesity. Most children only carry out mild to moderate physical activities, most children's daily lives are filled with physical activities that expend very little energy, such as most children riding motorbikes to school or taking the bus (Kurniagustina, 2018). Based on this background, the researcher is interested in conducting research on "The relationship between physical activity and eating patterns with obesity in students at State Junior High School 4 Malang City".

METHOD

Design

This research is a correlational study with a quantitative approach. This research was conducted to identify the relationship between physical activity and eating patterns with obesity in students of State Junior High School 4 Malang City.

Participants

The population in this study were all students at State Junior High School 4 Malang City. The determination of the sample in this study used a purposive sampling technique. According to Sugiyono, purposive sampling technique is taking samples according to the desired criteria to be able to determine the number of samples to be studied. In this study, a sample of 20 students was obtained. The dependent variable in this study is obesity, while the independent variables are physical activity and diet.

Research Instruments

The research instruments included measuring body weight using weight scales and measuring height using a microtoise. After getting the results of measurements of height and weight the data is calculated to obtain Body Mass Index data. Collecting physical activity data using the Physical Activity Questionnaire for Adolescents (PAQ-A) questionnaire developed by Kent C. Kowalski, Ph.D. Meanwhile, dietary data uses a 24-hour food recall which comes from nutrition teaching materials, a food condition survey written by Sirajuddin, SP, M.Kes, Surmita, S.Gz, M.Kes Dr. Ir. Trina Astuti, MPS. Then it was analyzed using nutrisurvey and energy was obtained from the respondents, then classifying the Nutrition Adequacy Rate (RDA) for each respondent using excel.

Data analysis

Data on physical activity and eating patterns that have been obtained were processed using SPSS version 23. This study used a correlation test to measure the strength of the relationship. The correlation test in this study applied Spearman's correlation test, multiple linear regression analysis and t test.

RESULTS AND DISCUSSION

The research entitled the relationship between physical activity and diet and obesity among students at State Junior High School 4 Malang City was conducted in January, 16-30 January 2023. This study was conducted at State Junior High School 4 Malang City, Lowokwaru District, East Java. Based on the data that has been obtained, the age of the respondents is 12 years to 15 years.

1. Normality Test

The normality test (Table 1) was carried out to find out whether the research variables used were normally distributed or not. The normality test is carried out as a condition for the parametric test to be used. The normality test was carried out using the Shapiro Wilk test because the sample in the study was less than 50 samples (N<50).

Table 1. Normality Test of Physical Activity and Eating Patterns with Obesity

	Shapiro-Wilk		
	Statistic	Df	Sig.
Pactivity (X_1)	.931	20	.161
Dietary habit (X_2)	.962	20	.585
Obesitas (Y)	.900	20	.052

2. Correlation Test

Correlation test was conducted to determine the level of closeness of the relationship between 2 variables. The correlation test in this study was carried out using the Spearman correlation test because the research variables were not normally distributed.

Table 2. Correlation test of physical activity with obesity

Correlations		
		Obesitas (Y)
Physical Activity (X_1)	Pearson Correlation	-.047
	Sig. (2-Tailed)	.021
	N	20

Based on the results of the Table 2 it is known that N or the amount of research data is 20. sig. between physical activity variable (X1) and obesity (Y) is 021 which is smaller than α (0.05), it is concluded that there is a significant relationship between physical activity and obesity. Based on the results of the table above, it is known that the correlation between the physical activity variable (X1) and the obesity variable (Y) is -047, so it can be concluded that the physical activity variable (X1) and the obesity variable (Y) have a very weak relationship.

Table 3. Diet Correlation Test with Obesity

Correlations		
		Obesitas (Y)
Dietary habit	Pearson Correlation	.261
	Sig. (2-Tailed)	.042
	N	20

Based on the results of the Table 3 it is known that N or the amount of research data is 20. Then the sig. between diet variable (X2) and obesity (Y) is 042 which is smaller than α (0.05), it is concluded that there is a significant relationship between diet and obesity. Based on the results of the table above, it is known that the correlation between the diet variable (X2) and the obesity variable (Y) is 261, it can be concluded that the diet variable (X2) and the obesity variable (Y) have a very weak relationship.

3. Multiple Linear Regression Analysis

Ghozali (2018) explained that multiple linear regression analysis is used to identify the direction and how much the independent variable influences the dependent variable. Multiple linear regression analysis in this study was used to find out how the condition of the dependent variable (obesity) was. If the independent variables (physical activity and diet) are indicators. This analysis is used by involving two or more independent variables between the dependent variable (Y) and the independent variable (X1 and X2).

Table 4. Multiple Linear Regression Analysis

Coefficients[a]			
	Unstandardized Coefficients		Standardized Coefficients
Model	B	Std. Error	Beta
(Constant)	37.722	10.942	
physical activity (X_1)	.191	.291	-.166
dietary habit (X_2)	.007	.040	.042
A. Dependent Variable: Obesitas (Y)			

From the results of the multiple linear regression Table 4, the multiple linear regression model is obtained as follows:

Obesity (Y)=37.722 - 0.191 (Physical Activity (X1)) + 0.007 (Eating Pattern (X2))

From the results of the linear regression equation, it can be concluded that the constant (α) is 37,722, which means that if all independent variables are equal to zero (0), then the level of obesity is high. The physical activity variable can reduce the obesity variable by 0.191. It can be concluded that physical activity can affect obesity. the dietary pattern variable can increase the obesity variable by 0.007, it can be concluded that diet affects obesity.

4. T test

This test shows how far the influence of the independent variables on the dependent variable. In the end, a conclusion will be drawn that H0 is rejected or Hα.

Table 5. T test of physical activity and diet with obesity

Coefficients^a

Model		T	Sig.
1	(Constant)	3.447	.003
	physical activity (X1)	.657	.020
	Dietary habit (X2)	.167	.049

A. Dependent Variable: Obesitas (Y)

Based on the t test Table 5 it can be obtained that the tcount value of the physical activity variable is 657 with a significant value of 020 < (0.05). Therefore, the decision to reject H0 was obtained with the conclusion that the physical activity variable has a significant effect on reducing the obesity variable.

Based on the t test table above, it can be obtained that the tcount value of the diet variable is 167 with a significant value of 049 <0.05. therefore the decision to reject H0 was obtained with the conclusion that the dietary pattern variable has a significant effect on increasing the obesity variable.

The relationship between physical activity and obesity in students of State Junior High School 4 Malang City

In this study there were 20 obese respondents aged 12-15 years. This gain was obtained from the results of Body Mass Index. From research conducted on children who suffer from obesity at State Junior High School 4 Malang City, the results of the correlation statistical test are sig. between physical activity variable (X1) and obesity (Y) is 021 which is smaller than α (0.05), it is concluded that there is a significant relationship between physical activity and obesity. The physical activity variable was able to reduce the obesity variable by 0.191, which means that the higher the level of physical activity, the lower the number of people who are obese. Physical activity is important for human life, in which humans move their bodies to

expend energy. Physical activity, namely all body movements, both small to fast and heavy movements, such as running a marathon. Little physical activity results in a lot of energy being stored in the form of fat, which in turn can lead to obesity in people who lack physical activity. This states that the level of physical activity is related to cases of excess body weight (Dewi & Kartini, 2017). In this study, respondents also tended to spend time only at school, after school they only stayed at home. When at home, few of them do other activities, most of them spend their time playing gadgets and watching television, so they do a little light physical activity at home. Urban residents are greatly facilitated by various convenient and easy transportation facilities, such as online transportation that is fast, cheap, easy to order, motorcycle taxis, and private cars.

This can also minimize the duration for physical activity and enough exercise to burn calories. Apart from a lack of physical activity, to increase awareness of the importance of physical activity for the body, the school must provide effective education about sports and be enthusiastic about participating in sports. In addition to providing education for students, interesting extracurricular materials must also be facilitated. Extracurricular activities can be used as a space to develop the interests and talents of each student. Through extracurricular programs one can discover one's talents and interests so that they can be developed to become seeds of future achievements both in sports and other fields. research conducted by Menschik et al states that adolescents who actively participate in PJOK (physical education) learning have a 5% lower chance of becoming obese as adults. Students who always participate in physical education learning and participate in extracurricular activities (Muhammad, 2018).

The relationship between eating patterns and obesity in students of State Junior High School 4 Malang City.

Significance value between diet variable (X2) and obesity (Y) is 042 which is smaller than α (0.05), it is concluded that there is a significant relationship between diet and obesity. the variable diet can increase the obesity variable by 0.007, where the more we consume food, the greater the rate of obesity. From the results of the study, respondents consumed a lot of high-calorie foods, the habit of eating snacks (calorie-dense foods), low consumption of fruits and vegetables, frequent consumption of fast food, irregular meal times. This research is in line with the theory of Gibney, Margetts, Kearney, & Arab (2013), which explains that excessive energy consumption will lead to excess body weight.

The pattern of eating that tends to consume fast food is caused by the environment where you live and school. Excessive intake of food and snacks can also result in increased body weight if the variants of snacks are high in sugar, fat, calories, and low in nutrients (Nisak & Mahmudiono, 2017). College students and school-aged youth are also a group of people who tend to be attracted to fast food advertisements on television. Fast food advertisements on television can increase intake patterns or also individual lifestyles in general (Evan et al., 2017). Food intake that is properly controlled can help in increasing a person's physical

fitness level, therefore nutritional aspects such as water, minerals, vitamins, fats, proteins, and carbohydrates must really be fulfilled for the body to function (Muharam, 2019).

This research was conducted at State Junior High School 4 Malang City, the location of this research was included in an urban or urban area. This is also a tendency for obesity, due to the influence of changes in lifestyle related to eating patterns and sports activities. In the study of Dwiningsih & Pramono (2013) stated the level of distribution of excess weight among adolescents in urban areas was higher than in rural areas. Respondents in this study also consumed fast food because State Junior High School 4 Malang City was carrying out full day school activities. Almost half of the day they spend at school and they consume food in the school canteen. State Junior High School 4 Malang City school canteen sells fast food such as geprek chicken, chicken noodles, fried rice and drinks containing sugar. Of course these foods are unhealthy foods for a person and are also a factor in the occurrence of obesity. From the above, the researchers hope that the results of this study can help educate readers to be aware of the importance of maintaining a balance between physical activity and eating patterns in order to avoid various kinds of diseases, one of which is obesity.

CONCLUSION

The contribution of this research is to determine the effectiveness of the perform+ training program in preventing ankle injuries, provide recommendations in this field, and suggest future research. Based on the results of the data analysis, it can be concluded that there is a significant improvement in the pretest and posttest with the provision of the perform+ training program. Therefore, future research is expected to add other variables, increase the sample size, and increase the intensity of the training, so that the research can be more widely identified.

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Referring to the results and discussion of research related to the relationship between physical activity and eating patterns with obesity in students of State Junior High School 4 Malang City, it can be concluded that there is a relationship between physical activity and eating patterns with obesity. From the results of statistical tests there is a significant relationship between physical activity and diet with obesity. From the research data, respondents also consumed a lot of unhealthy foods such as fast food and were not matched by physical activity. This certainly can be related to the incidence of obesity and can interfere with one's physical fitness.

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