



## **CORRELATION OF PHYSICAL ACTIVITY, FAMILY INCOME AND CONSUMPTION OF FRUITS AND VEGETABLES WITH THE INCIDENCE OF OBESITY IN ADOLESCENTS**

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### **Article Info**

#### Article History :

Received : March 2021

Revised : May 2021

Accepted : June 2021

Available online : June 2021

#### **Keywords:**

Obesity, Physical Activity, Family Income, Consumption of Fruits and Vegetables

### **Abstract**

Obesity is defined as an increase in energy intake compared to expenditure, resulting in depletion of body fat and eventually wearing weight. The prevalence of obesity has increased sharply in the Asia Pacific region. Many factors cause obesity. Based on data obtained from the Gorontalo District Health Office in 2018, it shows that the incidence of obesity was 8.795 cases (30.9%) consisting of 1.971 men (6.9%) and 6.824 women (24.0%). Objective: To determine several factors related to the incidence of obesity in adolescents in several high schools in Gorontalo District. This type of research uses observational analytic with a cross sectional study design. The population in this study were all students of class X and XI in SMA Negeri 1 Telaga and SMA Negeri 1 Tibawa, Gorontalo Regency as many as 1.341 students. By using the sampling technique of Proportional Stratified Random Sampling as many as 171 samples. With data analysis techniques using the test Chi Square. The results of the study of physical activity and consumption of fruits and vegetables had no relationship with the incidence of obesity in adolescents in several high schools in Gorontalo District. Meanwhile, family income has a relationship with the incidence of obesity in adolescents in several high schools in Gorontalo Regency in 2019. It is hoped that each school can increase various activities that can reduce obesity problems and can also provide education in the form of health education to students.

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ISSN 2685-6514 (Online)

ISSN 2477-331X (Print)

## INTRODUCTION

Obesity is defined as an increase in energy intake compared to expenditure, resulting in depletion of body fat and ultimately weight gain. This increase in body fat can change the risk of several diseases such as diabetes, hyperlipidemia, and hypertension, which are cardiovascular diseases and metabolic syndromes (Alam et al., 2015). The prevalence of obesity has increased sharply in the Asia Pacific region. Of the population in South Korea, 20.5% are overweight and 1.5% are obese. Meanwhile in Thailand, 16% of the population is overweight and 4% is obese. In urban China, 12% of the male population is overweight and 14.4% is experienced by women (Candra, et al., 2016).

Many factors cause obesity, including metabolic factors, genetic factors, food and physical activity, environmental, socio-cultural, and other behavioral factors. (Alam et al., 2015) stated that high-fat foods such as fast food are the cause of obesity. Other studies suggest that family income is also a cause of obesity. Research results from (Octari et al., 2014) found that obesity cases were more common in samples with income levels above the poverty line. And this family income also has an effect on giving pocket money to children. From some research found that the allowance is one of the causes of obesity ((Rosyidah & Andrew, 2013) (Rosyidah & Ririn Andrias, 2013). This can be explained

due to the allowance is large, then the child having an inclination often consume snacks in school Other factors that cause obesity are vegetable consumption, frequency of fast food consumption and physical activity (Gibney, et al, 2009; Candra, et al, 2016)).

Among adolescents, obesity or overweight is a problem that is quite worrying (Proverawati, 2010). Adolescence is a period of growth and development that will determine the development of the next period. Based on research, adolescents who are obese have a tendency to be obese in adulthood. Adolescents with obesity are at high risk of experiencing a number of health problems, such as heart disease, diabetes, asthma and several other non-communicable diseases (Sargowo & Andarini, 2011). The incidence of obesity in adolescents which has increased quite high is very worrying. In America as much as 8.1% of children aged 12-19 years have metabolic syndrome due to obesity, while in Iran as much as 17.4% of school age children are obese. Meanwhile, in North Africa as much as 15.4% of students are obese. (Lakshman et al., 2012; Masdar et al., 2016).

Ministry data states that the number of obese sufferers in Indonesia occupies ranked 10th in the world. Riskesdas 2018 data shows the prevalence of obesity in Indonesia experienced fluctuation from 14.8% in 2013, then decreased to 10.5% in the year 2017 and increased to 21.8% in 2018.

Based on data from the Ministry of Health (2018), Gorontalo Province is among the top 15 Provinces that contribute to the incidence of obesity. In 2017, there were 479 people aged 15 years and over who were obese, and in 2018 from January to August there were 296 obese sufferers aged 15 years and over

(Kemenkes RI, 2018). Based on preliminary data from several high schools in Gorontalo Regency, it is known that there are adolescents who are obese. Meanwhile, based on data obtained from the Gorontalo District Health Office in 2018, it shows that the incidence of obesity was 8,795 cases (30.9%) consisting of 1,971 men (6.9%) and 6,824 women (24.0%) ( Gorontalo

District Health Office 2018).

Based on the problem data above, the researchers are interested in conducting research on the determinants of obesity in high school adolescents in Gorontalo District. The variables studied were physical activity, frequency of fruit and vegetable consumption, family income and physical activity.

## METHODS

Type of research used observational analytic with a cross sectional study design. The population in this study were all students of class X and XI in SMA Negeri 1 Telaga and SMA Negeri 1 Tibawa, Gorontalo Regency as many as 1,341 students. By using the sampling technique of Proportional Stratified Random Sampling as many as 171 samples. With data analysis techniques using the test Chi Square. In this study, the incidence of determining obesity was using the body mass index (BMI). Categorized as obese, if BMI (Body Mass Index)  $\geq 30$  and not obese if BMI (Body Mass Index)  $\leq 30$ . This research was conducted at Senior High Schools in Gorontalo District, namely SMAN 1 Telaga and SMAN 1 Tibawa from 26 February to 26 March 2019.

Initial research that will be used as research locations is that there are 3 schools including SMAN 1 Telaga, SMAN 1 Tibawa and SMAN 1 Limboto, but only 2 schools studied, among others, SMAN 1 Telaga and SMAN 1 Tibawa, this is due to a pandemic outbreak that has occurred throughout the country, including Indonesia. So this is what causes research at SMAN 1 Limboto to be discontinued, because the school has implemented a system lockdown.

## RESULT

1. Physical activity  
activity was measured by knowing the

type of activity in the form of walking, by measuring MET (Metabolic Energy Turnover) / week. The criteria for strenuous activity, if 600-2,999 MET hours / week and light activity if  $< 600$  MET-hours / week. From the research results, it was found that the average value of the physical activity of the research subjects with the measurement of MET (Metabolic Energy Turnover) / week an average of 452.2, as many as 127 respondents from a total of 171 respondents. This means that research subjects who have light activity are more than research subjects whose physical activity is strenuous. The results of data analysis using statistical tests showed that the value of  $\chi^2$  count was 1.668  $< \chi^2$  table = 3.841 and the p-value was 0.197 ( $> 0.05$ ) this means that  $H_a$  is rejected or there is no relationship between physical activity and obesity

2. Income Family  
income is measured based on the 2020 Gorontalo Province Minimum Wage of IDR 2,788,826. The low category is if the respondent has an income  $< \text{UMP Rp. } 2,788,826$  and high if the respondent has an income  $\geq \text{UMP Rp. } 2,788,826$ . From the research results, it is known that as many as 94 respondents, their parents have an income of  $\geq \text{IDR } 2,788,826$ , while the remaining 77 respondents have parents with an income of  $< \text{IDR } 2,788,826$ . This means that more people have income above the UMP. The results of statistical test analysis showed that the value of  $\chi^2$  count was 6.290  $> \chi^2$  table = 3.841 and the p-value was 0.012 ( $< 0.05$ ), this means that  $H_a$  is accepted or there is a relationship between family income and obesity.
3. Consumption of Fruits and Vegetables.  
The frequency of fruit and vegetable consumption is measured by the day / week portion. Categorized sufficient if  $\geq 5$  servings / week and

less if <5 servings / day / week. Based on the results of the study, there were 116 respondents who consumed fruits and vegetables from 171 respondents. So that more people consume vegetables in the sufficient category. The results of data analysis using statistical tests obtained the results of the value of  $\chi^2$  count  $0.464 < \chi^2_{table} = 3.841$  and the p-value is  $0.496 (> 0.05)$ , this means that  $H_0$  is rejected or there is no relationship between the frequency of fruit and vegetable consumption and the incidence of obesity. .

## DISCUSSION

### Correlation of Physical Activity with the Incidence of Obesity

The average physical activity of the research subjects with the measurement of MET (Metabolic Energy Turnover) / week averaged 452.2. The results showed that the research subjects had more physical activity in the light category than the subjects with the heavy category of physical activity. Most of the adult population in Indonesia has less active physical activity. Physical activity if done regularly can prevent body gain and reduce the risk of obesity (Haskell et al., 2007). However, in this study there is no correlation between physical activity and obesity. This study is in line with previous research that there is no relationship between physical activity and the incidence of obesity (L Petersen et al, 2004; Pulsford et al., 2013). However, the results of the study found that there were 93 subjects with low activity who were obese. The condition of obesity causes them to be lazy their about activities, so that their time is only spent playing online games or playing social media on their cellphones. According to (Candra, et al, 2016) high body mass causes a tendency to be lazy to do activities. Conversely, there are also subjects who have strenuous activities,

but are obese, this is because they have unbalanced food consumption habits such as eating high-calorie foods. According to (Hendra et al., 2016) obesity in adolescents is largely influenced by diet. (Umania et al., 2014) explained that the incidence of obesity is caused by a person's chronic condition as well as socio-demographic factors. Another study states that obesity is caused more by an increase in energy intake than physical activity (Scarborough et al., 2011)).

According to (Christianto et al., 2018) the causes of obesity besides physical activity are also influenced by age, occupation, smoking status and stress levels.

### Income Correlation with the Incidence of Obesity

The results showed that there was a relationship between family income and obesity. Family income can affect the type and amount of food consumed. High-income families can buy various types of food, not only healthy nutritious food, but also high-calorie and high-fat foods that can lead to obesity (Nurmalina, R., & Valley, 2011). This result is in line with other research that there is a relationship between income and nutritional status, including obesity (Yuliah et al., 2018). The group with high economic status is a group susceptible to obesity ((Choi, et al., 2010). However, the study also found that parents who have high income but adolescents are not obese. This is because they have physical activity. However, it was also found that parents with low income were obese, it was because they consumed more carbohydrates, because they had difficulty buying high protein foods. According to research (Suryaputra, Kartika, 2012), a group of adolescents who experiencing obesity due to excess consumption of carbohydrates.

### Consumption of Fruits and Vegetables with the Incidence of Obesity in Adolescents

Based on the results of data analysis there is no relationship between the frequency of fruit and vegetable consumption with the incidence of obesity. This study is in line with previous studies, that there is no relationship between fruit and vegetable consumption and status. nutrition (Gunawan et al., 2019). The results of this study are in line with previous studies, that fruit and vegetable consumption is not associated with the incidence of obesity (Bey et al., 2019); (Sartika, 2011)). This study. Based on the results of the study, it is known that the respondents who consume fruits and vegetables are not much. Based on the results of the interview, this was due to the respondents' lack of interest in vegetables and fruit. This is because according to them the taste of the vegetables is not very good. As for fruit, they prefer to consume it in juice, so that there are other additional ingredients, such as milk sugar or syrup that can lead to obesity. The amount of vegetable and fruit consumption in the Indonesian population is still low when compared to the recommended adequacy of fruit and vegetable consumption in the context of Balanced Nutrition, and this deficiency occurs mostly in the adolescent age group (Hermina & S, 2016). However, this study is not in accordance with previous studies that the consumption of fruits and vegetables contributes to the incidence of obesity. (Yanto et al., 2020; Eryani et al., 2015). Adequate consumption of fruits and vegetables can function as anti-oxidants that can reduce the incidence of heart disease, obesity, cancer, diabetes, hypertension and stroke (Slavin & Lloyd, 2012; Ruxton et al., 2006)).

### CONCLUSION

Based on the results of the study, it was found that there was a correlation between income and the incidence of

obesity. But there is no correlation between physical activity, and consumption of fruits and vegetables. This is due to many factors that cause obesity. As a suggestion to continue to provide information about the importance of physical activity and consuming fruits and vegetables. For further research to add other variables associated with the incidence of obesity.

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