

A CASE CONTROL STUDY OF FACTORS RELATED TO OBESITY AMONG ELEMENTARY SCHOOL CHILDREN IN BANYUWANGI SUB- DISTRICT

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ABSTRACT

Obesity in school-aged children is a problem that can have a lasting impact until adulthood. In Indonesia, 11.9% of children aged 5-12 years are overweight and 7.8% are obese (IHS, 2023). Based on data from the health screening results of grade 1 elementary school students for the 2019/2020 academic year in Banyuwangi sub-district, there were 4.07% cases of obesity and 0.44% of obesity cases. This study aims to analyze the relationship between the parental income, frequency of junk food consumption and physical activity with the incidence of obesity in grade 1 elementary school children in Banyuwangi sub-district. This research method is observational with a quantitative approach and case control study design. The population used in this study was 1,178 students with obese and normal. The sample size for this study was determined using the Sample Size formula by Lemeshow et al, 1990, and the result of calculating the sample size for this study was

144. Sampling was carried out by probability sampling. Data was obtained by measuring students' BMI and interviews about parental income, FFQ questionnaire interviews and PAQ-C questionnaires. Analysis was carried out using the OR, and using chi-square analysis with a significance level ($\alpha=5\%$). The research results showed that the parental income (p value 0,000 and OR = 17,043), frequency of junk food consumption (p value = 0.005 and OR= 2.619) and physical activity (p value = 0.012 and OR = 2.333) are related to the incidence of obesity in elementary school children in the sub-district Banyuwangi.

Keywords: consumption of junk food, physical activity, elementary school children

INTRODUCTION

Obesity is a problem that still occurs in children. Obesity is a condition in which a person has a body with excessive fat deposits which can pose a risk to health. The problem of overnutrition has now become a global health problem, the prevalence of obesity throughout the world is increasing from year to year, as many as 21-24% of children in America are overweight and 10% are obese (Nur Amalia et al., 2016). The obesity epidemic is quickly becoming the biggest global public health challenge, ranking in the top three causes of chronic health disorders (Indonesian Ministry of Health, 2018). In Indonesia, 11.9% of children aged 5-12 years are overweight and 7.8% are obese (Indonesian Health Survey, 2023). Based on data from the Indonesian Health Survey (IHS, 2023), in East Java Province, 13.8% of children aged 5-12 years are overweight and 9.7% are obese. Based on data from the health screening results of grade 1 elementary school students for the 2019/2020 academic year in Banyuwangi sub-district, there were 4.07% cases of obesity and 0.44% of

obesity cases. In the working area of Banyuwangi sub-district, namely the Kertosari, Singotrunan and Sobo health centers, there are 47 elementary schools and based on data from the health screening results of grade 1 elementary school students for the 2019/2020 academic year, it is known that the number of obesity cases is 6.50% and obesity cases are 0.47 %. Even though the prevalence of overweight and obesity among elementary school students is 6.50% and 0.47%, Banyuwangi sub-district is the center of the city which is currently increasing rapidly in the establishment of restaurants and junk food outlets, especially around schools, making it easier for students to access junk food which encourages obesity.

Obesity in school-aged children is a problem that can have a lasting impact until adulthood. Obesity has many factors, the factors that often occur in children are behavioral factors, namely food consumption and physical activity. Modern lifestyles tend to cause children's nutritional status to be above normal, so that children

become fat or obese. This is because children eat a lot, but are less active, so the energy that enters the body is much more than the energy used for activity and growth (Izhar, 2020). Children with a high frequency of consuming junk food will increase fat deposits in the body and increase the risk of obesity.

Generally, what is included in the junk food category is food that has little nutritional content, but is high in salt, high in sugar, high in fat and high in energy. The presence of junk food in the Indonesian food industry can influence school children's eating patterns. The level of junk food consumption among teenagers is currently relatively high, with the average teenager consuming junk food 3 to 4 times a month (Widyastuti, 2018). Adolescents who consume excess calories will have a 4.69 times higher risk of experiencing obesity than adolescents who consume normal calories. Likewise, adolescents who consume excess fat and carbohydrates will be 2 times more likely to experience obesity compared to adolescents who

consume too much fat and carbohydrates sufficient (Kurdanti, et al. 2015). Based on Nur Amalia et al, 2016, the habit of eating junk food tends to be carried out by children who have a high socio-economic status. With increasing purchasing power, parents tend to spoil their children with junk food. The availability of junk food and easy access to it have a big influence on children's junk food eating habits (Nur Amalia et al, 2016).

Apart from that, the risk of obesity is also influenced by a person's physical activity. A high Body Mass Index (BMI/Age) which describes overnutrition includes a pattern of high energy consumption and lack of physical activity which leads to a sedentary lifestyle. As time goes by, technological developments become more sophisticated, making it easier for humans to fulfill their daily needs and physical activity decreases. Physical activity is a form of behavior while energy expenditure is the outcome of behavior. Low physical activity combined with excessive eating patterns can lead to obesity.

Based on the description above, researchers conducted research on the relationship between the parental income, frequency of junk food consumption and physical activity with the incidence of obesity in elementary school children in Banyuwangi sub-district. The research was conducted by measuring BMI/Age, parental income, frequency of consumption of junk food and physical activity in elementary school children. This study aims to determine the relationship between the parental income, frequency of consumption of junk food and physical activity with the incidence of obesity in elementary school children in Banyuwangi sub-district.

METHOD

This research uses observational research with a case control study design. This research uses a quantitative approach and does not provide any intervention. This research was conducted at elementary schools in Banyuwangi sub-district, Banyuwangi district, East Java Province in July-August 2022. The population used in this

study was 1,178 students with obese and normal taken from 44 schools in Banyuwangi sub-district, and the selection of the population was based on students' nutritional status, namely obesity (case) and normal (control). The sample size for this study was determined using the Sample Size formula by Lemeshow et al, 1990, and the result of calculating the sample size for this study was 144. The case group is respondents with obese nutritional status and the control group is respondents with normal nutritional status. Sampling was carried out by probability sampling using random sampling techniques from each group. Data collection was carried out by collecting primary and secondary data. Primary data collection techniques in this research was obtained by measuring students' BMI and interviews about parental income conditions at the time the research was conducted, FFQ questionnaire interviews regarding the frequency of consumption of junk food in the last 1 month and PAQ-C questionnaires regarding students' physical activity in the

last 7 days. Method of measuring the respondent's parental income category, it is said to be low if the parental income is below the Banyuwangi district minimum wage and it is said to be high if the parent's income is above the Banyuwangi district minimum wage. The results of measuring the frequency of consumption of junk food in this study were grouped into two categories, namely rarely (score < mean) and often (score > mean) and the results of measuring physical activity in this study were grouped into two categories, namely good physical activity (> Median) and physical activity less (<Median). Secondary data was obtained from data from the health screening results of grade 1 elementary school students for the 2019/2020 academic year, in the form of IMT results for elementary school students in Banyuwangi sub-district.

The dependent variable in this study is the incidence of obesity. The independent variables in this study are the parental income, frequency of junk food consumption and physical activity. Data processing

in this research was carried out univariate and bivariate. Univariate analysis was used to analyze the frequency and percentage distribution of each variable. The bivariate analysis stage in the research is used to continue the results of the previous univariate analysis which is useful for answering the research hypothesis, namely to determine the relationship between the dependent variable and the independent variable. Bivariate analysis was carried out using the Odds Ratio (OR) to determine the prevalence value and relationship value of the independent variable to the dependent variable, and using chi-square analysis with a significance level (α) of 5% or (0.05).

RESULT AND DISCUSSION

RESULT

1. Frequency Distribution of Factors Associated with the Incidence of Obesity

Table 1. Presenting factors associated with the incidence of obesity. Factors in this study consisted of parental income, frequency of junk food consumption and physical activity. Shows the results of the

frequency distribution of research respondents based on parental income, frequency of junk food consumption and physical activity. Parental income is the condition of the respondent's family income at the time the research was

conducted. Junk food consumption frequency is the respondent's frequency of junk food consumption during the last 1 month. Physical activity is the frequency of the respondent's physical activity during the last 7 days.

Table 1. Frequency Distribution of Factors Associated with the Incidence of Obesity

Variable	Category	Case (n)	Percentage (%)	Control (n)	Percentage (%)
Parental Income	low	8	11,1	49	68,1
	high	64	88,9	23	31,9
	total	72	100,0	72	100,0
Frequency of Junk Food Consumption	rarely	28	38,9	45	62,5
	often	44	61,1	27	37,5
	Total	72	100,0	72	100,0
Physical Activity	Good	27	37,5	42	58,3
	Less	45	62,5	30	41,7
	Total	72	100,0	72	100,0

Source: Questionnaire Data Processing (2022)

Seen from table 1. it can be seen that in the case group there were 8 (11.1%) respondents whose parents had low incomes, while 64 (88.9%) respondents whose parents had high incomes. In the control group, 49 (68.1%) respondents had low income parents, while 23 (31.9%) respondents had high income parents. Based on the frequency of junk food consumption in the case group was 28 (38.9%) respondents who rarely consumed junk food, while 44 (61.1%) respondents often consumed junk food. In the control group, 45 (62.5%) respondents rarely consumed junk

food, while 25 (37.5%) respondents often consumed junk food. Then, regarding the physical activity carried out by the case group was 27 (37.5%) respondents who had good physical activity while 45 (62.5%) respondents had less physical activity. In the control group, 42 (58.3%) respondents had good physical activity, while 30 (41.7%) respondents had less physical activity.

2. Analysis of the Factors Associated with the Incidence of Obesity

Table 2. Presents an analysis of the relationship between the respondent's parental income, the

respondent's frequency of junk food consumption, the respondent's physical activity and the incidence of obesity. To determine the prevalence value and the relationship value of the independent variable with the

dependent variable, the Odds Ratio (OR) is used. Next, the analysis was carried out

using the Chi-Square test with a degree of significance (α) of 5% or 0.05

Table 2. Analysis of the Factors Associated with the Incidence of Obesity

Variable	Category	Case (n)	Percentage (%)	Control (n)	Percentage (%)	OR	P Value
Parental Income	low	8	11,1	49	68,1	Ref	0,000
	high	64	88,9	23	31,9	17,043	
	total	72	100,0	72	100,0	CI (7,025-	
Frequency of Junk Food Consumption	Rarely	28	38,9	45	62,5	Ref	0,005
	Often	44	61,1	27	37,5	2,619	
	Total	72	100,0	72	100,0	CI (1,337-5,131)	
Physical Activity	Good	27	37,5	42	58,3	Ref	0,012
	Less	45	62,5	30	41,7	2,333	
	Total	72	100,0	72	100,0	CI (1,196-4,554)	

Source: Questionnaire Data Processing (2022)

From table 2, Based on the Odds Ratio (OR), parental income is a risk factor of obesity among elementary school children in Banyuwangi sub-district (OR=17.043, CI (7,025-41,352)). So, respondents who have parents with high incomes are 17,043 times more likely to be obese than respondents who have parents with low incomes. Based on the relationship test using the Chi Square test by looking at the Pearson Chi-square value, it was obtained that the p value was <0.05, namely 0.000, which means that there is a

relationship between parental income and the incidence of obesity in elementary school children in Banyuwangi sub-district.

Based on the results, frequency of consumption of junk food is a risk factor of obesity in elementary school children in Banyuwangi sub-district (OR=2.619, CI (1.337-5.131)). So, respondents who often consume junk food are 2.619 times more likely to be obese than respondents who rarely consume junk food. Next, the results of the relationship test using the Chi Square

test by looking at the Pearson chi-square value obtained a p value <0.05 , namely 0.005, which means there is a relationship between the frequency of junk food consumption and the incidence of obesity in elementary school children in Banyuwangi sub-district.

Then on the respondents' physical activity, looking at the odds ratio (OR) physical activity is a risk factor of obesity in elementary school students in Banyuwangi sub-district (OR=2.333, CI (1.196-4.554)). So, respondents who lack physical activity are 2.333 times more likely to be obese than respondents whose physical activity is good. Based on the results of the relationship test using the Chi Square test by looking at the Pearson chi-square value, it was obtained that the p value was <0.05 , namely 0.012, which means there is a relationship between physical activity and the incidence of obesity in elementary school children in Banyuwangi subdistrict.

DISCUSSION

1. Analysis of the Relationship between Parental Income and the incidence of Obesity

The research results show that the majority of children with high- income parents have obese nutritional status, while the majority of children with low-income parents have normal nutritional status. Based on results research, parental income is a risk factor for obesity and based on chi-square test analysis, it states that there is a relationship between parental income and the incidence of obesity in elementary school children in Banyuwangi sub-district. Research conducted by Rendy et al 2016 shows that the magnitude of the influence of high income on child obesity is known to be OR = 3.8, which means that children who have families with high incomes have 3 times the risk of becoming obese compared to children who have families with low incomes (Rendy et al 2016). This is in line with research conducted by Mayulu et al which states that there is a significant relationship between family income and the incidence of obesity (Mayulu et al, 2013). This is confirmed by research which states that a p value <0.05 (0.027) is obtained, which means there is a relationship between the

incidence of obesity and family income (Widyantari et al, 2018).

2. Analysis of the Relationship between Frequency of Junk Food Consumption and the incidence of Obesity

The results of the research show that the majority of children who frequently consume junk food rarely have normal nutritional status, while the majority of children who frequently consume junk food frequently have obese nutritional status. Based on results research, frequency of junk food consumption is a risk factor for obesity and based on chi-square test analysis, it states that there is a relationship between frequency of junk food consumption and the incidence of obesity. Factors that can cause high consumption of junk food in elementary school children are behavioral and environmental factors, where children's behavior in consuming food influences the child's nutritional status. Then environmental factors include the school environment, family environment and the surrounding environment that supports children to consume food, such as easy access to consume junk

food because it is close to various kinds of junk food outlets. This is in line with research conducted by Nur Amalia et al, which states that there is a significant relationship between the frequency of junk food consumption and overnutrition (p value = 0,013) and there is an influence between the frequency of consumption of junk food and the incidence of overnutrition with an (OR=2.13) (Nur Amalia et al, 2016). Supported by research conducted by Rizona, it was found that $p < 0.05$ (0.048), so statistically there is a significant relationship between the frequency of consuming junk food and the incidence of obesity in elementary school children in the working area of the Aur Duri health center, Jambi city (Rizona, 2020).

3. Analysis of the Relationship between Physical Activity and the incidence of Obesity

The results showed that the majority of children with good activity had normal nutritional status, while the majority of children with less activity had obese nutritional status. Based on results research, physical activity is a risk factor for obesity and based on chi-square test

analysis, it states that there is a relationship between physical activity and the incidence of obesity. This is in line with research conducted by Feby et al, it is known that the Odds Ratio value=0.016, CI(0.004 –0.068) which indicates that physical activity is a risk factor for the incidence of obesity in adolescents with light physical activity 0.016 times more risk of becoming obese, in comparison with adolescents with physical activity moderate (Feby et al, 2016). The results of other research also state that there is a significant relationship between physical activity and the incidence of overnutrition in children at SDN 04 Sendangmulyo, Tembalang sub-district, Semarang City (Anindyawati, 2016). The results of this study were strengthened by research conducted by Muchtar et al which stated that there was a relationship between physical activity and the incidence of obesity with $p=0.005$ ($p<0.05$) (Muchtar et al, 2012). Other research states that there is a significant relationship between physical activity and the incidence of obesity (Danari et al, 2013). This is

supported by the opinion of Edelman and Mandle, 2010 in Agustina, 2019 which states that less physical activity supports the occurrence of excess body weight (Agustina et al, 2019).

CONCLUSION AND RECOMMENDATION

There is a meaningful relationship between the parental income, frequency of junk food consumption and physical activity with the incidence of obesity in elementary school children in Banyuwangi sub-district.

Suggestions that can be given is that it is hoped that parents can introduce healthy food to their children by choosing food at home or purchasing food outside the home, parents can set limits on junk food consumption at home, and parents are expected to encourage children to do physical activities at home.

REFERENCE

- Agustina, L., T. Maas, L., & Zulfendri, Z. 2019. Analysis of Risk Behavior Factors on the Incidence of Obesity in Children Aged 9-12 Years at SD Harapan 1 Medan. *Endurance Journal*, 4(2), 371. <https://doi.org/10.22216/jen.v4i2.4051>.
- Anindyawati, D. 2016. Relationship between frequency of fast food

- consumption, physical activity and parental education level with the incidence of overnutrition in elementary school children. Thesis, 1–113. <http://repository.unimus.ac.id/id/eprint/27>.
- Danari, A. L., Mayulu, N., & Onibala, F. 2013. The Relationship Between Physical Activity and the Incidence of Obesity in Elementary School Children in Manado City. *Nursing Ejournal*, 1(1), 4–7.
- Febby et al. 2016. The relationship between physical activity and eating patterns and the incidence of obesity in students at Christian Middle School Eben Haezar 1 Manado. *Pharmaceutical Scientific Journal – UNSRAT* Vol. 5 No. 2.
- Health Research and Development Agency, Ministry of Health of the Republic of Indonesia. Main Results of Basic Health Research 2018. Ministry of Health of the Republic of Indonesia (2018).
- Indonesian Health Survey. 2023.
- Kurdanti, W., et al. 2015. Factors that influence the incidence of obesity in adolescents. *Indonesian Journal of Clinical Nutrition*.
- Maharani, S., & Hernanda, R. 2020. Factors Associated with the Incidence of Obesity in School-Age Children. *Multi Science Health Scientific Journal*, 12(2), 285–299. <http://jurnal.stikes-aisyiyah-palembang.ac.id/index.php/Kep/article/view/513/0>.
- Mayulu, N. Parengkuan, R. R. Ponijdan, T. 2013. The relationship between family income and the incidence of obesity in elementary school children in the city of Manado.
- Muchtar, A., Ramayanti, I., & Anggraini, W. 2012. Factors that influence obesity in elementary school children in grades IV and V at SD Xaverius II Palembang in 2011. *Syifa' MEDIKA: Journal of Medicine and Health*, 2(2). <https://doi.org/10.32502/sm.v2i2.1436>
- Nur Amalia, R., Sulastri, D., & Semiarty, R. 2016. Relationship between Junk Food Consumption and Overnutrition Status in Pertiwi 2 Padang Elementary School Students. *Andalas Health Journal*, 5(1) 185–190. <https://doi.org/10.25077/jka.v5i1.466>
- Rahmatika, K. N. 2019. The Relationship between Fast Food Consumption and Physical Activity with the Occurrence of Obesity in Adolescents in SK Jesu Malang. 4–14.
- Rendy et al. 2016. The relationship between family income and the incidence of obesity in elementary school children in the city of Manado. *Sam Ratulangi University Journal*.
- Rizona, F. 2020. The Correlation Of Junkfood Consuming Frequency and Sleep Duration Period to Children. Obesity Among Elementary School Students In Aurduri Public Health Center Development of Dreall healthy for obesity Children View project. November 2018. <https://www.researchgate.net/publication/342028220>.
- Rizona, F., et al. 2020. Distribution of Characteristics of Factors Causing Obesity in Elementary School Students. *Sriwijaya Nursing Journal*, 7(1), 54–58.
- Widyantari, N. M. A., Nuryanto, I. K., & Dewi, K. A. P. 2018. Relationship between physical activity, diet and family income with the incidence of obesity in elementary school children. *National Health Research Journal*, 2(2), 214–222. <https://doi.org/10.37294/jrkn.v2i2.121>
- Widyastuti, D. A. 2018. The Influence of Junk Food Consumption Habits on the Incidence of Adolescent Obesity. <https://doi.org/10.31219/osf.io/7d8ey>.
- Widyawati, N. 2014. Factors associated with obesity in elementary school children aged 6–14 years at SD Budi Mulia 2 Yogyakarta. Publication Manuscript of Aisyiyah Yogyakarta College of Health Sciences.