

FACTORS ASSOCIATED WITH THE INCIDENCE OF OBESITY IN SCHOOL-AGE CHILDREN

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ABSTRACT

Obesity in school-aged children has become a significant public health problem in many countries. Several factors, such as consumption of fast food, parental genetics, and lack of physical activity, can contribute to obesity. This study aims to identify factors associated with the occurrence of obesity in school-aged children. This research is included in the category of analytical observational research with a cross-sectional approach. The population studied was 57 respondents at SDN 1 Tubanusing a stratified random technique. The questionnaire used was a questionnaire on fast food consumption habits and physical activity habits. The results showed that the majority of students' parents, namely 25 respondents (43.9%), suffered from type I diabetes. The Mann Whitney test for fast food consumption produced a p-value of 0.429, while for physical activity it was 0.527. Specifically, a significant association was found between parental genetics and the incidence of obesity, with a p value of 0.010. Thus, it can be concluded that there is no relationship between fast food consumption and physical activity and the incidence of obesity in school-aged children. However, there is a relationship between parental genetics and obesity in this age group.

Keywords: Fast Food; Heredity; Obesity; Physical Activity

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INTRODUCTION

Obesity can be defined as the abnormal accumulation of fat or an excess of fat that poses health risks. Children experiencing overweight and obesity tend to persist with weight issues into adulthood, thereby increasing the risk of developing non-communicable diseases such as diabetes mellitus and cardiovascular diseases at a younger age. Therefore, the conditions of overweight and obesity in children need to be taken seriously as they can have a negative impact on their health in adulthood (Suryamulyawan and Arimbawa, 2019).

WHO (*World Health Organization*) gives information states that obesity has become a new

global challenge, unfortunately often overlooked in the context of family health. Nevertheless, the number of obesity cases continues to rise each year. Overall, it is estimated that around 10% of school-age children, aged between 5 and 17 years old, are experiencing obesity issues (Humaroh, 2013). According to the WHO in 2014, the number of children overweight or obese nearly doubled from 5.4 million in 1990 to 10.6 million in 2014 (Ryadi, 2016). Based on the Riskesdas 2018, the national prevalence among children aged 5-12 years indicates that the overweight rate is 9.2%, while the obesity rate is 10.8%. Meanwhile, the prevalence of school-age children experiencing underweight is 24%, with a 6.8% rate of being

excessively thin among children aged 5-12 years. In the Central Java province in 2018, the figures show 9.1% for the category of very overweight, 11.1% for overweight, 71.3% for normal weight, 6.5% for thinness, and 2.1% for very thinness (Kemenkes, 2018).

The results of the survey conducted by the Food and Drug Administration in 2018 indicate that in Indonesia, 80% of school children consume snacks within the school environment, either from vendors or around the school cafeteria. The frequency of snack consumption is more than 11 times per week (66%). In 2019, the World Obesity Federation predicted that the number of children and adolescents aged 5–19 years suffering from obesity is estimated to reach 206 million by 2025 and is projected to increase to 254 million by 2030 (Jebeile et al., 2022). The rising prevalence of obesity is influenced by various factors, including genetic factors, socio-economic conditions, stress levels, parental caregiving patterns, environmental factors, lifestyle, dietary habits, physical activity levels, age, gender, and cultural aspects (Sahoo et al., 2015).

The increase in body weight is also closely associated with the rise in the consumption of fast food. The term "fast food" refers to a type of food that is packaged, easily served, convenient, or processed in a simple manner. These foods are typically produced by the food processing industry using advanced technology and contain various additives for preservation and flavor enhancement. The high frequency of children consuming fast food can result in the accumulation of calories in the body, leading to an increase in the Body Mass Index (BMI) value. Fast food is considered negative due to its unbalanced nutritional content, containing more carbohydrates, fats, cholesterol, and salt (Bachtiar, 2020).

Obesity, when left unaddressed, can lead to serious health consequences, including an increased risk of cardiovascular diseases, musculoskeletal disorders, and cancer (WHO, 2021). Hence, preventive efforts are essential, involving measures such as regular exercise, maintaining a healthy sleep pattern, regulating dietary habits and portion sizes, and enhancing fiber intake to improve digestive function. In cases

where obesity has already occurred, the recommended approach involves establishing a negative energy balance. This includes adopting a controlled diet (by reducing meal portions) and increasing physical activity. Consequently, addressing obesity requires not only relying on healthy lifestyle changes but also necessitates a holistic approach to achieve optimal body balance (Kementerian Kesehatan RI, 2018).

Based on the Kemenkes (2017), physical activity is categorized based on intensity and the amount of calories required, namely light, moderate, and vigorous. This classification encompasses various daily activities, ranging from work and school-related tasks to other leisure-time activities. Physical activity has an impact on nutritional status, where light-intensity physical activity can lead to obesity, overweight, or even underweight due to the accumulation of excess energy in the body. This is attributed to a lack of calorie burning (Octaviani, Izhar and Amir, 2018).

According to the Global Nutrition Report (2020), the prevalence of obesity in children under 5 years old decreased from 5.9% in 2018 to 5.6% in 2019. Indonesia is classified as one of the 17 countries facing three simultaneous nutritional challenges, namely stunting (impaired growth), wasting (malnutrition), and overweight (excess weight) (Indanah et al., 2021).

Based on the findings of the research conducted by Iswanti *et al.* (2022), it is concluded that engaging in physical activities such as aerobic exercise can have an impact on body weight and body image perception. The study indicates that after participating in aerobic exercise sessions, there was a decrease in the respondents' body weight, which, in turn, influenced an improvement in their body image. This suggests that the physical activity has a positive effect on self-acceptance, reflected in the enhanced body image perceived by the respondents.

Meanwhile, the nutritional status monitoring survey in 2015 recorded that the prevalence of overweight toddlers according to WHZ for children aged 0-59 months is 5.3%. This reflects the condition of children in Indonesia, where 8 out of 100 children experience obesity. The prevalence of childhood obesity, measured by the Body Mass

Index-for-Age (BMI/A) in the 5-12 age group, is approximately 8% (Doddy, 2017). The habit of consuming fast food has become one of the contributing factors to obesity among children. The practice of consuming fast food has had a significant impact on the eating patterns of children in Indonesia. The current level of fast food consumption among children is relatively high, with adolescents on average consuming it 3 to 4 times a month. The presence of addictive substances in fast food also poses health risks when consumed excessively (Widyastuti & Sodik, 2018).

According to a study conducted by Lestari and Solikah (2017), at SD Mojosoongo V Surakarta, there is a correlation between the habit of consuming fast food and drinking soft drinks with the occurrence of obesity in children aged 6-12 years at SD Mojosoongo V Surakarta. Meanwhile, there is no relationship between variables such as gender, maternal education level, and primary eating habits with the incidence of obesity in children aged 6-12 years at SD Mojosoongo V Surakarta. According to a study conducted by Lestari, Handayani and Nurfadilah H (2023), there is a significant correlation between the habit of consuming fast food and the likelihood of obesity among adolescents. Unhealthy eating patterns, such as consuming fast food, are believed to have a negative impact on the nutritional status of adolescents, leading to the potential occurrence of obesity. Fast food, referring to types of food that are packaged, easily served, convenient, or processed in a simple manner, is suspected to play a key role as one of the main triggers for obesity in adolescents. Considering the preliminary study findings and recognizing the lack of maternal knowledge, along with the high prevalence of obesity, and understanding the importance of knowledge regarding factors associated with obesity, the researcher is interested in conducting a study on the "Factors Related to the Occurrence of Obesity in School-Age Children.

METHOD

This study employs a correlation research design, fundamentally investigating the relationship between two variables in a particular situation or group. It falls under the category of analytical observational research using a cross-sectional approach. The objective of this research is to comprehend the relationships by simultaneously conducting observations on the specified variables (Burhan, Afifah and Sari, 2022). This research was conducted at State Elementary School 1 Tuban 2. The study took place on January 25, 2023, and obtained Ethical Clearance with the number: 048/LPPM/ITS.PKU/I/2023.

The population in this study consisted of 130 students at SDN 1 Tuban. The sample was students in grades 1 to 6 of SD Negeri 1 Tuban with a total of 57 students selected randomly from each class. Data collection involves primary data obtained through questionnaire surveys and measurements. The questionnaire used was a questionnaire on fast food consumption habits and physical activity habits with a significance validity value of $p < 0.001$ and reliability test results with Cronbach alpha values of 0.805 and 0.888. In this research, the data to be collected will be obtained directly from respondents. First, this research conducted a preliminary survey at SDN 1 Tuban. Second, distribute questionnaire forms or conduct surveys followed by anthropometric measurements. After measurements are taken, the level of obesity in children is calculated and determined. In this study, data analysis used the Mann-Whitney test.

RESULT

In this study, there are four characteristics included, namely age, gender, weight, and height. The details of the characteristics of the respondents are as follows: The table above shows that the distribution of respondents based on age has the highest frequency at the age of 11, with a total of 24 respondents (42.1%). The highest gender is male, with 33 respondents (57.9%). Furthermore, the tallest height is in the 142-151 cm range, with 26 respondents (45.62%), and the highest weight is in the 28-43 kg range, with 25 respondents (43.86%).

Table 1. Characteristics of respondents based on age, gender, height, and weight at State Elementary School 01 Tuban in 2023 (n=57)

Factor	f	%
Age		
10 Years	12	21,1
11 Years	24	42,1
12 Years	21	36,8
Gender		
Male	33	57,9
Female	24	42,1
Height		
132-141	17	28,70
142-151	26	45,62
>152	14	25,68
Weight		
28-43	25	43,86
44-59	20	35,09
>60	12	21,05

Tabel 2. Characteristics of respondents based on Fast Food Consumption, Physical Activity, Heredity, and BMI at SD Negeri 01 Tuban in 2023 (n=57)

Factor	f	%
Fast Food		
Frequent	20	35,1
Rare	37	64,9
Total	57	100
Physical Activity		
High	18	31,6
Moderate	35	61,4
Low	4	7,0
Total	57	100
Heredity		
Underweight	19	33,33
Normal	3	5,3
Overweight	6	10,5
Obese I	25	43,9
Obese II	4	7,0
Total	57	100
Obesity		
Underweight	19	33,3
Normal	19	33,3
Overweight	4	7,0
Obese I	12	21,1
Obese II	3	5,3

Total	57	100
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The table illustrates the distribution of respondents based on the consumption of fast food among students at SD Negeri 01 Tuban, with a total of 57 respondents (100%). In the univariate analysis of fast food consumption, the highest result is found in the "rare" category, with 37 respondents (64.9%). From the above table, the distribution of respondents based on physical activity among students at SD Negeri 01 Tuban in 2023 can be observed, involving 57 respondents. The univariate analysis of physical activity indicates the highest level in the "moderate" category, with a total of 35 respondents (61.4%). The table also displays the distribution of respondents based on the hereditary factor of parents of students at SD Negeri 01 Tuban in 2023, involving 57 respondents. In the univariate analysis of hereditary factors, the highest result is found in the "obesity I" category, with 25 respondents (43.9%). From the table, the distribution of respondents based on the Body Mass Index (BMI) of students at SD Negeri 01 Tuban in 2023 is observed, involving a total of 57 respondents. The univariate analysis of the child's BMI shows the highest result in the "underweight" and "normal" categories, with a total of 19 respondents (33.3%).

Based on the food consumption patterns, it can be observed from 57 respondents who frequently consume fast food. The majority of respondents fall into the underweight category, namely 5 respondents, while 6 respondents have a normal weight status. There are 2 respondents with overweight status, 5 respondents with obesity type I, and 2 respondents with obesity type II. For students who rarely consume fast food, 14 of them are in the underweight category, 12 respondents have a normal weight, 3 respondents are overweight, 6 respondents have obesity type I, and 2 respondents have obesity type II.

Through an analysis using the Mann-Whitney test, a p-value of 0.429 was obtained, which is greater than the significance level α (0.05). Therefore, it can be concluded that the alternative hypothesis (H_a) is accepted, and the null hypothesis (H_o) is rejected. This means that

there is no significant relationship between the habit of consuming fast food and the occurrence of obesity in school-age children at SD Negeri 01 Tuban in 2023.

In the context of physical activity, out of 57 respondents, 18 respondents engage in physical activity with a high frequency, 35 respondents with a moderate frequency, and 4 respondents with a low frequency. The analysis using the Mann-Whitney test yielded a p-value of 0.527, which is also greater than α (0.05). Therefore, H_a is accepted, and H_o is rejected, indicating that there is no significant relationship between the habit of physical activity and the occurrence of obesity in school-age children at SD Negeri 01 Tuban.

Looking at the Body Mass Index (BMI), out of 57 respondents, the highest frequency is in the hereditary factor with obesity type II status, comprising 24 respondents, while the underweight status is only followed by 2 respondents. The analysis using the Mann-Whitney test produced a p-value of 0.010, which is smaller than α (0.05). Thus, H_a is rejected, and H_o is accepted, implying a significant relationship between the hereditary factor variable and the occurrence of obesity in school-age children at SD Negeri 01 Tuban in 2023.

DISCUSSION

The characteristics of the study participants are individuals who will undergo treatment or be involved in research or experiments, depending on the type or methodology of the study to be conducted. Based on the results of the characteristics of the study regarding age, it is known that the oldest child is 12 years old and the youngest is 10 years old, with an average age of approximately 11.16 years. The occurrence of obesity in childhood can increase the risk of developing type 2 diabetes mellitus (DM). Additionally, there is a risk of experiencing obesity in adulthood and the potential to cause disturbances in glucose metabolism and degenerative diseases such as heart disease, blocked blood vessels, and so on. Furthermore, obesity in 11-year-old children can also have a negative impact on intelligence levels, as the activities and creativity of children tend to

decrease, and they become less active due to excess body weight.

School-age children, ranging from 6 to 12 years old, possess greater physical strength, developing individual traits, and a high level of activity, rendering them increasingly independent and less reliant on their parents. This period marks a diverse phase of growth and development in children, potentially influencing the formation of their character and personality. Throughout the school-age period, children begin to undergo core experiences, considered the commencement of taking responsibility for their own behavior, particularly in relationships with peers, parents, and others. Additionally, the school-age years serve as a time when children build the foundational knowledge necessary for success in adapting to adult life and acquiring specific skills (Diyantini et al., 2015).

Fast food refers to a type of food that is easily packaged, served, practical, or processed in a simple manner. Generally, these foods are produced by the food processing industry using advanced technology and contain various additives for preservation and enhancing the flavor of the products (Valoka and Reinaldi, 2017). Obesity is an abnormal accumulation of fat that can disrupt health in both adults and toddlers. If obesity occurs during childhood, there is a high likelihood that this condition will persist into adulthood. Obesity has a significant impact on the growth and development of children, particularly in psychosocial aspects. Children experiencing obesity are at risk of various health-threatening conditions, including cardiovascular diseases, diabetes mellitus, and other illnesses (Indanah et al., 2021).

Various factors influence the emergence of food cravings, such as the presence of stressful situations, boredom or feelings of emptiness, childhood habits reinforced by the provision of food as a reward, which then develop into habits in adulthood, and the impact of social environment (Trimawati & Wakhid, 2018).

The research findings indicate that there is no correlation between the level of fast food consumption and the occurrence of obesity. This finding aligns with the study by Widyantara, Zuraida and Wahyuni, (2014), which shows no

correlation between the habit of consuming fast food and the Body Mass Index. However, these research results do not align with the findings reported by Emilda (2020), which indicates a relationship between fast food consumption and Body Mass Index.

In this study, the majority of students from SD N 01 Tuban are categorized as those who rarely consume fast food. Most of them consume fast food once or twice a month. However, when it comes to carbohydrates like rice or noodles, most students fall into the category of frequent consumers, with a frequency of up to 5 times a week or even daily. Fast food contains high levels of calories, fat, protein, sugar, and salt, while its fiber content is relatively low. If consumed continuously and excessively, it can lead to overnutrition issues (Widyastuti & Sodik, 2018). These findings align with the research by Mayangsari, Wahyuningtyas and Puspita (2018) which indicates a correlation between the habit of consuming fast food and the risk of overnutrition (p -value = 0.035). The study's results also indicate that students who frequently consume fast food have an overnutrition incidence rate of 69.2% (45 samples).

Physical activity refers to any body movement that increases energy expenditure and causes changes in the energy needed for physical activity, varying depending on the intensity and duration of the activity. The heavier and longer the physical activity, the higher the energy requirement. Physical activity affects an individual's obesity status because it depends on the use of nutrients consumed through activity (Tarigan, 2017).

The results of the study conducted by Erliana and Hartoto (2019) indicate that a 14% increase in physical fitness can be achieved through physical activity. Meanwhile, other influencing factors, accounting for 86%, involve genetics, age, gender, exercise habits, nutritional status, hemoglobin levels, health conditions, smoking habits, and adequate rest patterns. Therefore, it is hoped that by engaging in physical activities, children experiencing obesity can enhance their fitness levels. According to the

Centers for Disease Control and Prevention (CDC) (2021), children and adolescents aged 6 to 17 are recommended to engage in moderate to vigorous-intensity physical activity for at least 60 minutes or more each day. These activities include daily aerobic exercises and bone-strengthening exercises, such as running or jumping. A study conducted by (Elhakeem et al., 2020) analyzing data from 2,569 participants in the Children of the 90s study, found that dedicating more time to moderate to vigorous-intensity physical activity (MVPA) since the age of 12 is associated with better hip strength at the age of 25.

From the research results, it can be concluded that there is no relationship between the level of physical activity and the occurrence of obesity. This result is consistent with the study by Wulandari, Lestari and Fachlevy (2016), which indicates no correlation between physical activity and obesity. However, this study contradicts the research conducted by Andrewartha and Saraswati (2017), which shows a relationship between physical activity and the occurrence of obesity in school-age children based on the body mass index.

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Obesity occurs when the intake of energy in the form of calories from food is greater than the energy expended through activity. Lack of physical activity, such as the habit of children preferring indoor activities, watching television, and playing online games, can lead to overweight. This lack of movement habit over a long period can have adverse effects on children's health because it has the potential to cause overweight and obesity (Misnadierly, 2017).

From the conducted research, it can be observed that there is a relationship between the level of physical activity and the occurrence of obesity. This finding aligns with the study conducted by Lutfah (2018), which indicates a genetic connection to the occurrence of obesity. Another study by Sikalak, Widajanti and Aruben (2017), also demonstrates a genetic link to obesity. Obesity can be passed down from one generation to the next within a family. Therefore, it is often observed that parents who are obese tend to have children who also experience obesity. Genetic factors seem to play a role in determining the amount of body fat cells. A child has a 40% chance of experiencing obesity if one of their parents is obese. If both parents are overweight, the likelihood of a child experiencing obesity increases to 80% (Lutfah, 2018).

The involvement of genetic factors in increasing the risk of obesity is known based on the fact of differences in the speed of body metabolism between individuals. Individuals with a slower metabolism have a greater risk of suffering from obesity (Iswara, 2020). Based on the frequency distribution, 25 respondents (43.9%) have obesity I status. From this study, it can be concluded that the cause of obesity is not only genetic or hereditary factors but is also influenced by other factors such as a lack of physical activity and excess socioeconomic conditions.

CONCLUSION

The analysis of fast food consumption data, no significant relationship was found between the habit of consuming fast food and the occurrence of obesity in school-age children. Regarding physical activity, the study indicates that there is no significant relationship between physical activity

and the occurrence of obesity in school-age children at the school. There is a significant relationship between genetic factors and the occurrence of obesity in school-age children. May the findings of this research contribute significantly to further research development, and it is hoped that parents can strive to reduce the occurrence of obesity in children based on the provided information.

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