ORIGINAL ARTICLE

The Relationship Between Sedentary Behaviour and the Incidence of Obesity in School-aged Children at Elementary School Mekarsari 09 Tambun Selatan

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ABSTRACT

Introduction: Obesity is becoming an epidemic health problem in the world. The prevalence of obesity and overweight among school-aged children in Indonesia is higher at 20%, consisting of overweight (10,8%) and obesity (9,2%) than that of lean children (9,2%). Excessive sedentary behaviour can increase the risk of various health problems, one of which is obesity. Bekasi Regency in West Java Province has the 7th highest number of children aged 5-12 years with obesity. People who engage in sedentary behaviour at the age of 10-14 years is at (64.4%). Objective: To determine the relationship between sedentary behaviour and the incidence of obesity in school-age children at Elementary School Mekarsari 09 South Tambun. **Materials and methods:** The research design is cross-sectional with a total sample of 179 students in grades 4,5,6 selected through a probability sampling technique. ASAQ (Adolescent Sedentary Activity Questionnaire) questionnaire which has been tested for validity and reliability with good results was used to measure sedentary activities performed by children. **Results:** Among the 179 respondents studied, the majority of children engaged in moderate sedentary behaviour 119 respondents (66.5%) and the results of the Chi-Square test p-value = 0.617> α 0.005 means that there is no significant relationship between sedentary behaviour and the incidence of obesity. **Conclusion:** The amount of sedentary activity in elementary school children is not associated with the problem of obesity. However, students with obese nutritional status are advised to do more physical activity and reduce sedentary activities.
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INTRODUCTION

Obesity is a complex problem that can occur at various ages, including among school-age children. Elementary school children are children aged 6-12 years. At this time, children are known as the transition phase from early childhood to late childhood to puberty or towards puberty. (1). Children's growth and development require proper nutrition; therefore, there are no deviations in children's growth and development (2). An imbalance in nutritional intake is one of the causal factors that can cause disorders in children including obesity. Obesity can occur if energy intake exceeds energy expenditure. Lack of physical activity and movement in children such as sedentary behavior triggers obesity (3).

Sedentary behavior, a physical activity that involves minimal movement or physical inactivity, such as prolonged periods of lying, sitting, or engaging in screen-based activities, has become a growing public health concern in recent years. Sedentary activity refers to all types of activities carried out outside sleeping hours with the characteristics of very low-calorie production, namely <1.5 MET. Sedentary behavior must be limited because several studies have shown that sedentary behavior is a risk factor for obesity.

Sedentary behavior, such as the use of electronic devices (television, laptops, video games) in children, is very common in this sophisticated era, and this can be associated with risks to children's health (5). It is estimated that two-thirds of children worldwide live less active lives. In Indonesia, the length of sedentary activity for school-age children (10-14 years) is 3-5.9 hours (42.7%) (4). According to data from the Ministry of Health of the Republic of Indonesia (2018b), the peak in physical activity is in the age range of 40–44 years, namely 78.9% (sufficient). Meanwhile, among people who lacked physical activity at the age of 10-14 years,

64.4% (less) (6).

Other factors that can also reduce children's physical activity include busy working parents and children who are left at home with their siblings or grandparents. Therefore, children will be happier watching television, playing gadgets or video games, listening to music, and other activities that use less energy. Instead of performing activities that cause sweating, parents equip or provide facilities for their children, such as gadgets, computers, laptops, and video game(3).

As decision-makers and role models for their children, parents are crucial to the development of their offspring. Children's sedentary behavior must be reduced with parental engagement. Children's sedentary behavior must be reduced with parental engagement. Kids typically do sedentary things like watch TV, use electronics, and spend a lot of time sitting down at home (4).

In this modern era, parents started to get their children accustomed to using gadgets. Parents are less concerned about the impact if children tend to play games with snacks, which can make children lazy to engage in physical activity, and the impact on children at risk of obesity.

According to the World Health Organization (WHO, 2019), more than 340 million kids and teenagers between the ages of 5 and 19 were overweight or obese in 2016. From under 4% in 1975 to more than 18% in 2016, the prevalence of overweight and obesity in children and adolescents aged 5-19 years has increased. The boys' and girls' increases were comparable. In contrast, RISKESDAS reports that 9.2% of Indonesian pupils between the ages of 5 and 12 are obese. Papua (15.3%), DKI Jakarta (14.0%), the Riau Islands (12.5%), East Kalimantan and Jambi (11.4%), and East Java (11.1%) were the five Indonesian provinces with the highest prevalence of obesity. Out of 34 provinces, West Java Province (9.6%) came in 11th place (6).

In West Java province such as Depok City (16.02%), Sukabumi (15.26%), Subang (12.69%), Indramayu (12.69%) and Karawang (11.90%) are the five regencies/ cities highest among children with obesity. Bekasi Regency (11.90%) is ranked 7th with the highest prevalence of children aged 5-12 years with obesity out of 27 regencies/cities recorded in West Java (7).

Based on research conducted by Arundhana et al. (2016) with the title "Sedentary Behavior as a Risk Factor for Obesity in Elementary School Children in Yogyakarta City and Bantul Regency," there were 488 samples consisting of 244 cases and 244 controls. In the population of elementary school children (both public and private) in grades 1 to 5, it was found that obese students engaged in sedentary activities longer than non-obese students, with an average difference of 49.81 minutes/day ($p<0.01$). The results of Chi-square analysis showed that sedentary behavior was significantly related to the incidence of obesity with OR=6.93 (95%CI: 4.56-10.54). Based on the type of sedentary behavior, there was a significant relationship between the screen-based and sitting categories ($p <0.05$) (8).

According to Silwanah's 2019 research, which involved 60 elementary school students in grades 4-6, there was no correlation found between physical activity ($p=0.543$) and energy intake ($p=0.436$) and obesity in elementary school students in grades 4-6. Instead, there was a relationship between familial ($p=0.038$; POR=3.6) and sedentary life ($p=0.022$; POR= 4.6) with obesity in elementary school students. We may conclude that among Salatiga City elementary school students in grades 4-6, there is a correlation between sedentary behavior and the incidence of obesity and no correlation between physical activity and the prevalence of obesity (5).

Based on the results of a preliminary study conducted at Elementary School Mekarsari 09 Tambun Selatan, it was found that the school's weight and height measurement data in 2021 for overweight children was 7.97%, while that for obese children reached 12.60% out of 627. Several students appeared to have a larger body than their peers did. By administering a questionnaire in the form of a Google form to students in grades 4, 5, and 6, accompanied by interviews, it was found that 75% of school-age children already had personal cell phones and used them for more than two hours a day. On average, 90% of the children used vehicles to travel to and from school. Female students also said that they preferred playing in the classroom during break times over playing in the yard or on the school field.

Based on the above background, the incidence of sedentary behavior in students at Elementary School Mekarsari 09 is quite high and will have an impact on the incidence of obesity in school-aged children, therefore researchers are interested in conducting research on "The Relationship between Sedentary Behavior and the Incident of Obesity in Children at Elementary School Mekarsari 09 Tambun Selatan."

MATERIALS AND METHODS

This research uses a quantitative descriptive research design with a cross-sectional method. The test used is Chi-Square. Sampling in this research was carried out by probability sampling using the Stratified Random Sampling method, which is a technique for determining samples based on strata or levels but is less proportional (9). Respondents in the research were 179 children aged 9-12 years in grades 4, 5, and 6.

Data Collection Instruments

Data collection was conducted after obtaining permission from the research site, the researcher selected

respondents according to the inclusion criteria that had been determined. Data collection was carried out for 5 days assisted by a research assistant. The researcher measured height and weight using a calibrated tool to obtain accurate results, after which each respondent would be given a questionnaire containing questions about sedentary activities.

To measure the level of Sedentary behavior in children, the ASAQ (Adolescent Sedentary Activity Questionnaire) questionnaire was used. The questionnaire used in the study has been tested for validity and reliability with the results of 11 questions declared valid with an r table value of more than 0.344 with an r alpha value of 0.699 so that the questions are declared reliable. Respondents filled out questions that describe all of the respondents' sedentary activities during the last 7 days or the last week, including 5 effective days (Monday, Tuesday, Wednesday, Thursday, and Friday) and 2 school holidays (Saturday and Sunday). Respondents were given a list of activities to be filled in by writing down the number of minutes/hours in doing the activity. Respondents can write the minutes/hours in fractions such as hour or 30 minutes. The results of the questionnaire were calculated as the total sedentary activity in 7 days and the average was calculated in one day, then classified into light sedentary (<2 hours/day), moderate sedentary (5 hours/day), and high sedentary (> 5 hours/day) (10).

Body weight measurement using a GEA digital foot scale: accuracy of 0.1 kg in kilograms (kg) that has been calibrated and height measurement using a Microtoise with an accuracy of 0.1 cm in centimeters (cm), by considering the standard operating procedures that have been implemented by the CDC 2015. Calculation of Body mass index (BMI, kg / m2) is carried out using the WHO Anthroplus software application. Classification of nutritional status uses the standard deviation of the 2020 PMK concerning child anthropometric standards which are then grouped into non-obese <2SD and obese> 2 SD (11).

Data collection

Data collection was conducted after obtaining permission from the research site, the researcher selected respondents according to the inclusion criteria that had been determined. Data collection was carried out for 5 days assisted by a research assistant. The researcher measured height and weight using a calibrated tool to obtain accurate results, after which each respondent would be given a questionnaire containing questions about sedentary activities.

Population and Sample

The population of this study was elementary school children aged 10 to 13 years in the category of grade levels 4, 5, and 6, with a total of 297 students. Sampling in this study was carried out by probability sampling using the Stratified Random Sampling method, which is a technique for determining samples based on strata or levels but is less proportional (9). The method for measuring the size of the sample in this study used the Slovin formula, based on the calculation results obtained from a sample of 179.

Data analysis

Data analysis was conducted in this study using SPSS software version 23. Descriptive analysis was used to analyze the characteristics of children consisting of age, gender, BMI (Body Mass Index), and Sedentary Behavior Activity. To determine the interaction of two variables, namely the relationship between the independent variable and the dependent variable, which was tested using the Chi-Square statistical test with a significance level of $p < 0.05$.

Ethical Clearance

This study approved by Health Research Ethics Committee Sekolah Tinggi Ilmu Kesehatan Bani Saleh with a number of ethical clearance is No: EC.38/KEPK/STBS/V/2023.

RESULTS

In this study, data collection was carried out directly using printed questionnaire sheets (hard copy files) to determine the characteristics of respondents including name, age, gender, height,
body, weight and there is an ASAQ (Adolescent Sedentary Activity Questionnaire) questionnaire which consists of 11 questions. The statistical test used for univariate analysis uses descriptive statistical tests aimed at describing the characteristics of respondents and researchers can also find out the distribution of data. For bivariate analysis, researchers used the Chi-Square test which aims to determine the relationship or difference between two or more variables.

The research results based on the characteristics of respondents including age, sex, and grade show that the majority of ages in this study were in the 11-year age range, with a total of 70 respondents (39.1%), while children aged 10 and 12 years had a total of 52 respondents (29.1%), and five respondents (2.8 %) were aged 13 years. The majority of the respondents in this study were 95 (53.1%) girls, while 84 (46.9%) were boys. The majority of the classes were in grade 4 with a total of 68 respondents (38.0%), in grade 5 there were 61 respondents (34.1%) in grade 6 there and 50 respondents (27.9%). (Table I)

Table I: Characteristics of Respondent (n=179)

Variable	n	(%)
Age (years) :		
10 years	52	29
11 years	70	39
12 years	52	29.1
13 years	5	2.8
Sex :		
Girls	95	53.1
Boys	84	46.9
Grade :		
4	68	38.0
5	61	34.1
6	50	27.9

Based on nutritional status, the results of the analysis showed that the majority of respondents had a non-obese nutritional status, 144 respondents (80.4%), and 35 respondents (19.6%) had an obese nutritional status. Elementary School children are aged between 6 and 12 years. For children's growth and development, it is important to obtain proper nutrition to avoid deviations. Malnutrition weakens the immune system in children. (Table II)

Table II: Distribution of Nutritional Status

Variable	n	(%)
Nutritional Status:		
Obesity	35	19.6
No Obesity	144	80.4
Total	**179**	**100**

The majority of respondents 119 (66.5%) had moderate sedentary behavior, followed by 34 with Low sedentary activity and 34 (19%) with high sedentary behavior 24 (13.4%), according to the analysis's findings on sedentary behavior. (Table III)

Table III: Distribution of Sedentary Behavior

Variable	n	(%)
Sedentary Behavior		
Low	34	19
Moderate	119	66.5
High	24	13.4
Total	**179**	**100**

This study's bivariate analysis uses the Chi Square statistical test to evaluate the association between each independent variable and the dependent variable to identify the interaction of two variables. The analysis's findings revealed that 24 respondents (13.4%) had a total obesity nutritional status and were practicing moderate sedentary behavior. In contrast, 97 respondents (54.2%) were not obese. They were practicing moderate sedentary behavior, 6 respondents (3.4%) were highly sedentary and had an obese nutritional status, and 18 respondents (10.1%) had high sedentary behavior. They were not practicing moderate sedentary behavior, and 29 respondents (16.2%) had low sedentary behavior and were not obese. The Chi-Square statistical test yielded a p-value of 0.617, which is greater than α = 0.005, indicating the rejection of Ha and acceptance of H0. This suggests that there is no significant correlation between the incidence of obesity and sedentary behavior in school-aged children in grades 4, 5, and 6 at SDN Mekarsari. 09 South Tambun. (Table IV)

Table IV: Relationship Between Sedentary Behavior and Nutritional Status

Sedentary Behavior	Nutrition Status				Total		*P-value*
	Obesity		No Obesity				
	N	%	N	%	N	%	
Low	5	2.8%	29	16.2%	34	19%	
Moderate	24	13.4%	97	54.2%	121	67.6%	0,617
High	6	3.4%	18	10.1%	24	13.4%	

DISCUSSION

Sedentary behavior is the lifestyle of someone who tends to be lazy about doing physical activity or moving the body, characterized by an energy expenditure of <1.5 metabolic (METs), with a sedentary sitting and lying position (12). Lack of physical activity and sedentary behavior are closely related to the incidence of obesity. Obesity occurs because of an imbalance between energy in and energy out. Energy that is not used will be stored in the form of fat in adipose tissue.

The high level of sedentary behavior that occurs in school-aged children can be caused by age factors. Children aged 7-12 years spend 3.1 hours per day doing activities such as watching television and playing games (13). Screen-based activity, especially watching TV, is the most sedentary behavior carried out by elementary school-age children (14). Many children spend less than 7 hours per week doing physical activities and two hours per day of sedentary activities, activities such as using tablets/personal computers/phones/videogames, this causes children to rarely make large movements. a contributing factor to obesity. Parental education influences the adoption of unhealthy lifestyles in children, so it is necessary to involve parents and families in encouraging children to engage in physical activity and reduce sedentary behavior (15).

One of the things that can lead to obesity is sex. A person's nutritional demands are variable depending on their gender. According to Demerath, women naturally store more body fat than men do, particularly around the abdomen. Women's slower metabolisms than men's are the cause of this. Age-related changes in body composition are correlated. One unchangeable risk factor was age. Nevertheless, several studies have found that childhood obesity is not primarily caused by or triggered by age (16).

Children who have high activity levels and inconsistent eating patterns often experience an imbalance between their nutritional intake and adequacy. An imbalance between nutritional intake and adequacy will cause dietary problems, both over-nutrition and under-nutrition

(17). The findings of this study are consistent with that of Saputri et al.'s (2019) Analysis of the Relationship Between Sedentary Lifestyle and the Incidence of Obesity in Elementary School Age Grades 4-6 (Study in Salatiga City), which indicates that, out of a total of 60 respondents (15), more than 38 (63.34%) are not obese and that most children with nutritional status are not obese. The usage of sedentary behavior in children with obesity is higher than in normal children, both on weekdays and weekends. Obese children are also more likely to participate in low or sedentary physical activity (18)

Sedentary behavior poses a risk of reducing energy expenditure, the more time spent doing sedentary activities, the greater the opportunity to reduce energy. This can result in an increased risk of overnutrition and obesity. Sedentary behavior is a strong risk factor for suffering from overweight and obesity. This is because a sedentary lifestyle (low physical activity) causes fat to accumulate in the body and not be released as energy (16).

CONCLUSION

Based on the results of research entitled The relationship between sedentary behavior and the incidence of obesity in school-aged children at Elementary School Mekarsari 09 Tambun, it can be concluded that the majority of children engage in moderate levels of sedentary activities, 119 respondents (66.5%), while 34 respondents (19%) had mild sedentary behavior, high sedentary behavior were 24 respondents (13.4%) had high sedentary behavior. School-age children dominate moderate levels of sedentary behavior, which is one of the factors causing obesity in children. A total of 144 children had a non-obese nutritional status (80.4%), and 35 children had an obese nutritional status (19.6%). It was found that children with nutrition who are not obese also engage in sedentary behavior, which is one of the factors causing obesity in school-aged children. The results of the chi-square test showed that there was no significant relationship between sedentary behavior and the incidence of obesity in school-aged children in grades 4, 5, and 6 at Elementary School Mekarsari 09 Tambun Selatan.

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