


Relationship between Sedentary Lifestyle and Obesity in Elementary School Age Children at Lentera Harapan Elementary School Tomohon

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Article Info	ABSTRACT
<p>Keywords: Obesity, Sedentary Lifestyle, Elementary School Children</p>	<p>The purpose of this study was to determine the relationship between sedentary lifestyle and obesity in children aged 9-12 years at SD Lentera Harapan Tomohon. Quantitative research method with cross sectional study design. The population amounted to 116 people using total sampling. Research results: children who do low-level sedentary lifestyle as many as 43 respondents (37.1%), respondents with moderate-level sedentary lifestyle as many as 28 respondents (24.1%), and children with high-level sedentary lifestyle 45 respondents (38.8%) where school-age children dominate in doing high-level sedentary lifestyle, which is one of the factors for obesity in children. Children with obesity and non-obese status also carry out low to high levels of sedentary lifestyle, which is one of the factors for obesity in school-age children with a percentage of 42 children (36.2%) and those who are not obese are 74 children (63.8%). The analysis test shows that the p value = 0.000 (<0.05) means that there is a significant relationship between sedentary lifestyle and obesity in children aged 9-12 years at SD Lentera Harapan Tomohon.</p>
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INTRODUCTION

Sedentary lifestyle is a lifestyle that is dominated by sedentary activities for a long duration, such as watching television for hours, playing games, using laptops, and spending time in front of other electronic media. This lifestyle is increasingly prevalent along with technological developments and easy access to digital devices in the modern era (Park et al., 2020). The factors that cause sedentary lifestyle start from the type of work, hobbies, facilities / conveniences, and habitual factors with the classification according to (Maidartati, et al. 2022) is a low level of sedentary lifestyle, moderate sedentary lifestyle, high sedentary lifestyle.

The development of an increasingly modern era with easy access that supports daily activities encourages everyone to take advantage of it, including children. This convenience brings them into an age where everything is so easily accessible without the need for more effort. Some sedentary lifestyles that are often carried out by children include watching television, using vehicles as a means of transportation to school, playing video games, using the internet and consuming instant food. This results in children lacking balanced physical

activity which has an impact on health problems. Here are some of the impacts of sedentary lifestyle behavior (Park, et al. 2020) as follows: 1). The increase in obesity is influenced by passive lifestyles, 2). Emergence of metabolic diseases due to screen time habits, 3). Higher risk of cancer.

One impact that is rarely highlighted but has an equally dangerous impact and people tend not to care is obesity. Obesity is excess body fat that accumulates and is stored in a person's fat tissue, causing weight gain which can have adverse health effects (Arundhana & Masnar, 2021). Based on data from the World Health Organization (WHO) regarding the incidence of obesity, 37 million children under the age of five suffer from obesity. More than 390 million children and adolescents between the ages of 5 and 19 are overweight, and 160 million will be obese by 2022 (WHO, 2024).

Several previous studies by Puti Kulindam Suto stated that there is a relationship between the incidence of obesity and quality of life in school-age children (Puti Kulindam Suto, 2021). Research by Anggun Rafisa et al concluded that family socioeconomic status, parents' education level, and parents' awareness of oral hygiene and dental visits can influence the relationship between overweight and obesity (Rafisa, et al, 2023). Research results from Rista Dwi Hermilasari concluded that in some aspects, only diet can provide benefits for OA patients with overweight or obesity (Rista Dwi Hermilasari, 2023). Furthermore, Erni Murdaningsih concluded the need to conduct early screening of cardiovascular disease risk in obese and non-obese adolescents since school age so that prevention can be done earlier (Erni Murdaningsih, 2023). Research conducted by Muhammad Salman Naguib et al stated that obesity can cause insulin resistance which results in atherosclerosis resulting in impaired blood circulation in the legs which can cause diabetic ulcers (Muhammad Salman Naguib, et al, 2024). The latest research from Indah Rusman et al summarizes the results of research at Bhayangkara Hospital, namely the relationship between age, gender, obesity and occupation (Indah Rusman, et al, 2025).

The basic principle of obesity is due to an energy imbalance that occurs over a long period of time, although the causes of this imbalance are very complex and multifactor. Obesity cases in Indonesia are increasing, within 10 years there has been a significant increase in obesity from 10.5 percent in 2007 to 21.8 percent in 2018. Based on data compiled from the Indonesian Health Survey 2023 (SKI), the prevalence of overweight is 11.9% and those who are obese are 7.8%. The data shows that along with development and industrialization followed by changes in lifestyle, the prevalence of nutrition has increased quite high compared to the prevalence of obesity. The highest region is North Sulawesi with 31.2%. Based on data collected from the Indonesian Health Survey (2023) the prevalence of obesity in Tomohon City in children aged 9-12 years reached 9.1%.

From the results of preliminary observations at Lentera Harapan Elementary School located in Talete I Village, Central Tomohon District, Tomohon City, North Sulawesi, it was found that there was no systematic measurement of nutritional status of its students. . This has led to a lack of accurate data on the nutritional condition of children in the school, making it difficult to determine effective prevention and treatment measures. In fact, monitoring

children's nutritional status is an important step in early detection of health problems that can affect children's growth and development, both physically and psychologically.

The purpose and urgency of this study is to understand the extent to which sedentary lifestyle affects the risk of obesity among elementary school-aged children. The results of this study are expected to provide a scientific picture as a basis for health education interventions, school policies that support physical activity, and guidelines for healthy lifestyles to prevent and reduce the prevalence of obesity.

METHODS

Type of Research

This type of research is a quantitative method with a cross-sectional study design. Where this research emphasizes the time of measurement of variable data is only done one time research only, to determine whether there is a relationship between the independent variable (Sedentary Lifestyle) and the dependent variable (Obesity).

Research Location and Time

The research was conducted at Lentera Harapan Elementary School, Tomohon, North Sulawesi with the research time since the issuance of the research permit with a range of December 2024 to January 2025.

Population and Sample

The population in this study were children of Lentera Harapan Tomohon Elementary School aged 9-12 years, totaling 116 people. Children aged 9-12 years are a transitional age group from childhood to adolescence, where lifestyle behaviors begin to form and have the potential to become habits in the future. In addition, the use of this age makes it easier to fill out the questionnaire, because children aged 9-12 years already have knowledge of writing and reading. The sample used in this study was 116 people using the total sampling method, which means that the entire population was used as a sample.

Variable Type

Variables in this study include independent variables: Sedentary Lifestyle, and the dependent variable: Obesity.

Data Collection

The type of data collection used in this study is described as follows:

- a. Observation
Researchers use observation as a data collection method by going directly to the field, observing the symptoms under study, and then describing the problems that arise.
- b. Questionnaire
Respondents only choose answers that have been provided by the researcher, and the questionnaire is a set of questions that are compiled based on the measurement tools of the research variables.
- c. Field Notes
This data collection method involves the researcher going directly to the field, observing the symptoms under study, and then describing the problems that arise.
- d. Documentation

Documentation in this research includes field data that supports primary and secondary.

The instrument used in the study as a measuring tool to collect the information needed in the study. To find out the sedentary lifestyle of Lentera Harapan Tomohon Elementary School children using the Adolescent Sedentary Activity Questionnaire (ASAQ). According to (Rahma & Wirjatmadi, 2020) all respondents' sedentary activities during the previous week, including two days off school and five effective days, were documented using the ASAQ questionnaire (Adolescent Sedentary Activity Questionnaire). Students were given a list of tasks to complete, along with the amount of time allocated to each task. Answers from the questionnaire will be summed over seven days, averaged over one day, and categorized as Low (less than two hours per day), Medium (2-5 hours per day), and High (more than five hours per day).

The Adolescent Sedentary Activity Questionnaire (ASAQ) research instrument test was conducted on 30 students. Instrument testing is one way to find out which questionnaires are valid $r_{count} > r_{table}$ and invalid $r_{count} < r_{table}$ with the formula of r_{table} is $df = N - 2$.

a. Validity Test

To determine the validity of the ASAQ questionnaire, this study was sought by looking at the r_{table} value for 9 questions, then obtained $df = n - 2 = 30 - 2 = 28$. With a significance level of 5%, the r_{table} value for 28 respondents is 0.361, and each question item has a value of more than 0.361. So the ASAQ (Adolescent Sedentary Activity Questionnaire) questionnaire which has 9 questions is declared valid on all question items and can be used for research.

b. Reliability Test

Table 1. Reliability Test

Cronbach's Alpha	N of Items
.757	9

In the ASAQ questionnaire with 9 questions, the reliability value of $r_{alpha} 0.757 > 0.6$ means that the questionnaire is reliable. Then the ASAQ questionnaire is declared reliable on all question items.

To measure obesity variables using a tool called BMI with Z Score.

Table 2. Z Score threshold

Index	Nutrition Status Category	Threshold (Z-Score)
Body Mass Index by Age (BMI/U) of children 5-18 years of age	Undernutrition (<i>thinness</i>)	- 3 SD sd < -2 SD
		- 2 SD sd < +1 SD +1
	Good nutrition (normal)	SD sd < +2 SD
		> + 2 SD
	Overweight (<i>Overweight</i>)	
	Obesity (<i>obese</i>)	

Based on the category threshold according to Permenkes RI No. 2, 2020, there are 4 categories of nutritional status, researchers further simplify the categories into 2 types, namely not obese and obese because it is in accordance with the needs of the analysis, namely comparing the presence or absence of obesity not from the level.

RESULTS AND DISCUSSION

Overview of the Research Location

Lentera Harapan Elementary School is one of the schools in Talete I Village, Central Tomohon Sub-district, Tomohon City, North Sulawesi. This school is located on the edge of a big road, precisely on the Beriman Terminal road. Lentera Harapan Tomohon School is a Christian school with the following vision and mission:

- a. Vision: True knowledge, Faith in Christ and divine character.
- b. Mission: Proclaiming the primacy of Christ and actively engaging in the redemptive restoration of all things in Him through holistic education.

Lentera Harapan Elementary School is led by a principal named Mrs. Selvi Yuliana Putri Ardy, B.Sc., S.Pd and has a teaching staff of 26 people consisting of teachers and staff. Teachers are one of the factors that contribute to the success of education. Each teacher is expected to be able to explain the material and methods used in the teaching process. In addition, educators can help their students become sons and daughters of faith in everyday life.

Univariate Analysis

Univariate analysis was carried out with the aim of knowing the distribution and characteristics of the respondents studied with a total of 116 people and each variable both independent and dependent variables. The univariate results in this study are as follows:

Distribution of Respondents by Gender

Table 3. Distribution of respondents based on gender

Gender	F	(%)
Male	71	61,2
Female	45	38,8
Total	116	100

Based on table 3, the gender distribution of respondents shows that the largest number is male with 71 (61.2%) respondents and the lowest number is female with 45 (38.8%) respondents.

Distribution of Respondents by Age Group

Table 4. Distribution of respondents based on age

Age	F	(%)
9 years old	24	20,7
10 years old	49	42,2
11 years old	39	33,6
12 years old	4	3,4
Total	116	100

Based on Table 4, the age distribution of respondents shows that the proportion of respondents aged 10 years is the largest at 49 people (42.2%), while the proportion of respondents aged 12 years is the lowest at 4 people (3.4%).

Distribution of Respondents Based on Sedentary Lifestyle

Table 5. Distribution of respondents based on sedentary lifestyle

<i>Sedentary Lifestyle</i>	F	(%)
Low	43	37,1
Medium	28	24,1
High	45	38,8
Total	116	100

Based on table 5, the distribution of respondents based on Sedentary Lifestyle places the highest number of respondents (45, or 38.8%) in the high group and the lowest number of respondents (28, or 24.1%) in the moderate category.

Distribution of Respondents Based on Obesity

Table 6. Distribution of respondents based on obesity

	F	(%)
Obese	42	36,2
Not Obese	74	63,8
Total	116	100

Table 4.3 shows that the distribution of respondents based on obesity with the highest number is not obese as many as 74 respondents (63.8%).

Bivariate Analysis

To determine the relationship between the independent and dependent variables, bivariate analysis was used. Chi-square test, which has a significance level of p value <0.05, was the statistical test used for bivariate analysis. The results of the bivariate analysis in this study are as follows:

Table 7. Relationship between Sedentary Lifestyle and Obesity

<i>Sedentary Lifestyle</i>	Obesity		Total		<i>P-Value</i>
	No Obesity	Obesity	N	%	
Low	42	1	43	37,1	0,000
Medium	25	3	28	24,1	
High	7	38	45	38,8	
Total	74	42	116	100,0	

Based on table 7. shows that respondents who have a low sedentary lifestyle with no obesity total 42 respondents (56.8%), moderate sedentary lifestyle with no obesity total 25 respondents (33.8%), high sedentary lifestyle with no obesity total 7 respondents (9.5%),

while low sedentary lifestyle with obesity category total 1 respondent (2.4%), moderate sedentary lifestyle with obesity category total 3 respondents (7.1%), high sedentary lifestyle with obesity category total 38 respondents (90.5%).

Based on the results of the analysis using the Chi-Square test conducted to see the relationship between Sedentary Lifestyle and obesity, it was found that the p-value = 0.000 (<0.05) which means that there is a significant relationship between Sedentary Lifestyle and obesity in elementary school children at SD Lentera Harapan Tomohon, North Sulawesi.

Discussion

Based on the results of statistical tests obtained data from 116 students of Lentera Harapan Elementary School Tomohon North Sulawesi consisting of 71 males and 45 females, dominated by men. This is in line with research (Maidartati, et al. 2022) which suggests the characteristics of respondents and a description of sedentary lifestyle with obesity in 50 students who attend Bandung High School, most of the respondents are male as many as 31 people (62%). In contrast to research (Bokau et al. 2023) on the relationship between sedentary behavior and obesity in students at GMIM Koka Elementary School which shows that most of the incidence of obesity occurs in female students with a total of 15 children (17.6%) and the rest in men totaling 10 children (11.8%).

Based on the results of statistical tests obtained data from 116 students of SD Lentera Harapan Tomohon North Sulawesi consisting of 45 respondents with high sedentary lifestyle and 28 respondents with moderate sedentary lifestyle, dominated by the high category. This is supported by research (Timiyatun, et al. 2023) with the results showing that of 118 respondents, the majority had a high sedentary lifestyle, as many as 77 people (65.3%) and some respondents who had a moderate sedentary lifestyle category as many as 12 people (10.25%). This is caused by rapid technological advances that make sedentary behavior increase.

The results of statistical tests obtained data from 116 students of SD Lentera Harapan Tomohon North Sulawesi consisting of 74 non-obese respondents and 42 obese respondents, dominated by non-obese. This is in line with research (Rahmad, 2019) showing that the number of elementary school students who are not obese shows a higher percentage than students who are obese.

Relationship between Sedentary Lifestyle and Obesity

Table 8. Bivariate Test Results

		Obesity		Total	
		Not Obesity	Obesity		
Sedentary Lifestyle	Low	Count	42	1	43
		% within Obesitas	56.8%	2.4%	37.1%
	Medium	Count	25	3	28
		% within Obesitas	33.8%	7.1%	24.1%
	High	Count	7	38	45
		% within Obesitas	9.5%	90.5%	38.8%
Total	Count	74	42	116	
	% within Obesitas	100.0%	100.0%	100.0%	

Sedentary Lifestyle is one of the light physical activities. The limit is the average physical activity that is done less and very low to do physical activity. Sedentary behavior refers to daily habits that involve prolonged periods of sitting or lying down. These activities can occur in a variety of places, such as in the work environment when sitting at a desk, using a computer, or reading. At home, these behaviors include watching television or playing games, and on the go, such as on a motorcycle, bus or train (Park et al. 2020).

The distribution of 45 respondents who were in the high sedentary lifestyle category as many as 38 respondents (90.5%) were in the obese category. The results of the analysis using the Chi-Square test showed that the p -value = 0.000 (<0.05) which means that there is a significant relationship between sedentary lifestyle and obesity in elementary school children at SD Lentera Harapan Tomohon North Sulawesi. This shows that sedentary lifestyle is one of the causes of obesity.

This study agrees with (Anggraini, et al. 2023), namely based on statistical results using the Chi-Square test, the p value is 0.010 <0.05 , so H_0 is rejected, which means there is a relationship between sedentary lifestyle and obesity. The results obtained show that adolescents who have a sedentary lifestyle but are not obese are 18 people (24.0%). In contrast to research (Yuniarahmah, 2023) with the results of statistical tests obtained p -value = 0.617 $> \alpha$ 0.005 which shows that H_a is rejected and H_0 is accepted, which means that there is no significant relationship between sedentary behavior and the incidence of obesity in school-age children in grades 4,5, and 6 at SDN Mekarsari 09 South Tambun.

This excessive sedentary lifestyle can have adverse health effects and is a significant contributing factor to the onset of obesity, various diseases and potential mortality. Sedentary behavior is one component of light physical activity. Physical activity only contributes to one-third of energy expenditure in normal-weight individuals; however, in overweight individuals, physical activity takes on a very important role. During physical activity, calories are expended; thus, greater exercise volume correlates with increased calorie loss through the body's metabolic processes and overall energy expenditure. Calorie intake has an indirect influence on the basal metabolic system. Individuals who engage in prolonged periods of sitting will likely experience a decrease in their basal metabolic rate. A lack of motor activity can start an adverse cycle, where obesity makes physical activity very challenging and less enjoyable, and the resulting lack of exercise will consequently have an indirect negative impact on decreasing an individual's basal metabolism (Park, et al. 2020).

CONCLUSION

Based on the results of research conducted on the relationship between sedentary lifestyle and obesity in children aged 9-12 years at SD Lentera Harapan Tomohon, it was concluded that 43 respondents (37.1%) had a low level sedentary lifestyle, 28 respondents (24.1%) had a medium level sedentary lifestyle, and 45 respondents (38.8%) had a high level sedentary lifestyle where school-age children dominated in carrying out a high level sedentary lifestyle, which is one of the factors for obesity in children. Furthermore, it is found that children with obese and non-obese status also carry out low to high levels of sedentary lifestyle, which is one of the factors for obesity in school-age children with a percentage of 42 children (36.2%)

and those who are not obese as many as 74 children (63.8%). The analysis test shows that the p value = 0.000 (<0.05) means that there is a significant relationship between sedentary lifestyle and obesity in children aged 9-12 years at SD Lentera Harapan Tomohon. Future research is recommended to examine more about the relationship between sedentary lifestyle and obesity with dietary variables and types of food consumed in children aged 9-12 years.

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