

FACTORS OF SEDENTARY LIFESTYLE IMPACT ON ADOLESCENT HEALTH IN PALEMBANG CITY

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ABSTRACT

A sedentary lifestyle is a behavior that requires non-significant energy expenditure which causes detrimental effects on health that are often not realized. Lifestyle is divided into smoking habits, diet and physical activity. In children, this leads to decreased physical activity which results in obesity. This is a cross sectional, observational analytic study that aims to understand the factors sedentary lifestyle impact on health status of adolescents in Palembang city. We use primary data using questionnaire. There is total of 130 adolescents predominantly within age range of 12-16 years old and majority of females. Bivariate analysis showed that adolescents with a high sedentary lifestyle have 3,33 higher risks of obesity compared to those with moderate sedentary lifestyle (OR=3,33; 95% CI=1,45-7,62). In addition, there is significant association between sedentary lifestyle and blood pressure, in contrast with insignificant relationship with random blood glucose level. The level of physical activity tends to be lower in the older group of adolescents, added with modern lifestyle with all of conveniences, thus the energy that should be spent for physical activity become stored as fat, leading to obesity.

Keywords: *sedentary lifestyle, adolescent, obesity*

1. INTRODUCTION

A sedentary lifestyle is a behavior that requires non-significant energy expenditure which causes detrimental effects on health that are often not realized. In children, this leads to decreased physical activity which results in obesity. This is triggered by technological advances that turn everything more convenient.¹ Lifestyle consists of smoking habits, diet and physical activity. According to WHO (2010), sedentary lifestyle is a risk factor of multiple diseases, including cardiovascular disease, diabetes mellitus, insulin resistance, hypertension, dyslipidemia, obesity, and others.²

Obesity is excessive accumulation of fat due to an imbalance of energy intake and energy expenditure. Over 1.4 billion adults are overweight and more than 500 million adults worldwide are obese.^{3,4} The number of obese

adults in Indonesia has increased from 10.5% (2007) to 21.8% in 2018.⁵ Smoking is a risk factor for hypertension and myocardial infarction, which can reduce both expectancy and quality of life.⁶ Diet as an indicator of lifestyle, also has impacts on nutritional status. An unhealthy diet, which is low in fibre and high in fat, can result in weight gain. According to some researches, approximately 95,5% of Indonesian aged ≥ 5 years lack of consuming fibre, whether in the form of vegetables or fruits. As many as 45% of the population still consume a lot of fatty foods 1-6 times a week. Lack of physical activity is one of the causes of various diseases such as obesity. About 15% of the 1.6 million new chronic diseases diagnosed each year are caused by an unhealthy lifestyle. Low physical activity will increase the risk of developing non-communicable diseases by 20-30%

compared to people with sufficient physical activity, namely 150 minutes per week.⁷

It is important to address smoking habit, diet, physical activity, and health status. Therefore, the objective of this study is to understand the factors sedentary lifestyle impact on health status of adolescents in Palembang city.

2. METHODS

This is a cross sectional, observational analytic study, conducted on August 2022 at working area of Puskesmas Kertapati, Palembang. The sample of the study are adolescents in the working area of Puskesmas Palembang which are eligible according to inclusion and exclusion criteria, done with method of random sampling. Based on calculations using the following formula, the minimum number of samples required are 90 participants. The inclusion criteria of this study are those who are 12-21 years old and willing to participate in this research. While those who refuse to fill out a questionnaire or fill out a questionnaire incompletely were excluded.

The collected data is primary data. Primary data is obtained directly using questionnaire. All of the collected data will be analysed using statistical data processing program software SPSS 24. The nutritional status variable was obtained from the measurement results of body height and weight. Blood pressure and blood glucose values were obtained using sphygmomanometer and glucometer, respectively. Univariate analysis was conducted to dilakukan to obtain an overview of the statistical size and frequency distribution of each variable. Bivariate analysis was done with Chi-square test with confidence interval of (CI) 95% and significance level of 5% of 0,05 ($\alpha=0,05$). Results are considered significant if $p<0.05$. Furthermore, the results of the analysis are made in the form of tables and narratives.

3. RESULT

Univariate analysis was conducted to determine the frequency distribution of demographic characteristics in 130 adolescents in Palembang City with the characteristics presented in Table 1. Most of the participants were teenagers in the age group of 12-16 years (75.4%) and 62.3% were female. Most of the participants have fathers with education level of high school/equivalent in 51.5%, work as private employees in 39.2%, and have income in the range of Rp. 2,000,000–4,999,999 as much as 90%. In addition, it was dominated by teenagers with mothers with education level of high school/equivalent in 35.4%, unemployed in 55.4%, and with no income in 53.1%. The sedentary lifestyle behavior of adolescents in Palembang City was 29.2%, with an overweight nutritional status of 14.6%, hypertension of 13.1% and generally with moderate blood glucose levels.

Table 1. Characteristics frequency distribution of participants

Variables	n	%
Age		
Early adolescent	98	75,4
Late adolescent	32	24,6
Gender		
Male	49	37,7
Female	81	62,3
Father's education level		
Elementary school	2	1,5
Junior high	7	5,5
Senior high	67	51,5
D3	15	11,5
Bachelor	37	28,5
Master's degree	2	1,5
Father's occupation		
PNS/army/policeman	34	26,2
Entrepreneur	15	11,5
Private sector employee	51	39,2
Wholesalers	2	1,5
Small traders	3	2,3
Businessman	1	0,8
Laborer	11	8,5
Unemployed	1	0,8
Others	10	7,7
Passed away	2	1,5

Father's income			Moderate	92	70,8
None	2	1,5			
Rp. 500.000 – Rp. 999.999	1	0,8	Nutritional status		
Rp. 1.000.000 – Rp. 1.999.999	8	6,2	Overweight	19	14,6
Rp. 2.000.000 – Rp. 4.999.999	117	90,0	Normal	111	85,4
Rp. 5.000.000 – Rp. 20.000.000	2	1,5	Blood Pressure		
Mother's educational level			> 120/80 mmHg	17	13,1
Elementary school	4	3,1	≤ 120/80 mmHg	113	86,9
Junior high	11	8,5	Random Blood Glucose		
Senior high	46	35,4	High	38	29,2
D3	26	20,0	Moderate	92	70,8
Bachelor	40	30,8			
Master's degree	1	0,8			
None	2	1,5			
Mother's occupation					
PNS/army/police woman	21	16,2			
Entrepreneur	3	2,3			
Private sector employee	20	15,4			
Small traders	1	0,8			
Laborer	1	0,8			
Unemployed	72	55,4			
Others	12	9,2			
Sedentary lifestyle					
High	38	29,2			

Bivariate analysis was carried out with the aim of analysing the relationship between sedentary lifestyle and health status including nutritional status (BMI/A), blood pressure, and random blood sugar. Sedentary lifestyle was categorized into high and moderate, and nutritional status (BMI/A) was categorized as overweight and normal. The results of the bivariate analysis between sedentary lifestyle and nutritional status (BMI/A) are presented in Table 2.

Table 2. The relationship between sedentary lifestyle dan nutritional status (BMI/A)

Variable	Category	Nutritional status (BMI/A)				Total	<i>p-value</i>	OR (95% CI)
		Overweight		Normal				
		n	%	n	%			
Sedentary lifestyle	High	11	28,9	27	71,1	38	0,007	3,33 (1,45-7,62)
	Moderate	8	8,7	84	91,3	92		

Based on the results of statistical calculations of bivariate analysis, we observed that the proportion of adolescents with a high sedentary lifestyle and overweight nutritional status (BMI/A) was as high as 28.9%, while adolescents with a moderate sedentary lifestyle and overweight nutritional status (BMI/A) was 8.7%. Chi-square test results in *p-value* of 0,007 suggesting a significant association between sedentary lifestyle and nutritional status (BMI/A) of adolescents in Palembang city. This result concludes that adolescents with high sedentary lifestyle have a 3,33 high risk of overweight compared to those with

moderate sedentary lifestyle. (OR=3,33; 95% CI = 1,45-7,62).

Sedentary lifestyle is classified into high and moderate, while blood pressure value is classified into >120/80 mmHg and ≤120/80 mmHg. The bivariate analysis findings between moderate sedentary lifestyle and hypertension are presented in Table 3.

Based on the results of the statistical calculations of bivariate analysis in Table 3, the proportion of adolescents with a high sedentary lifestyle and having blood pressure > 120/80 mmHg is 23.7%, while adolescents with a moderate sedentary lifestyle and have

blood pressure > 120/80 mmHg by 8.7%. According to chi-square test, the p-value was 0.041, therefore it can be concluded that there

is a significant relationship between sedentary lifestyle and blood pressure of the adolescents in Palembang City.

Table 3. The relationship between sedentary lifestyle and blood pressure.

Variable	Category	Blood Pressure				Total	<i>p-value</i>	OR (95% CI)
		>120/80 mmHg		≤ 120/80 mmHg				
		n	%	n	%			
Sedentary lifestyle	High	9	23,7	29	76,3	38	100	0,041
	Moderate	8	8,7	84	91,3	92	100	

Based on the results of the statistical calculations of bivariate analysis in Table 3, the proportion of adolescents with a high sedentary lifestyle and having blood pressure > 120/80 mmHg is 23.7%, while adolescents with a moderate sedentary lifestyle and have blood pressure > 120/80 mmHg by 8.7%. According to chi-square test, the p-value was 0.041, therefore it can be concluded that there is a significant relationship between sedentary lifestyle and blood pressure of the adolescents in Palembang City.

The normality test was carried out on the blood sugar variable with a p-value of 0.000, thus it can be concluded that the blood sugar data is not normally distributed. Therefore, the analysis was carried out using Mann Whitney test. The results of the bivariate analysis between sedentary lifestyle and random blood sugar when presented in Table 4.

Table 4. The relationship between sedentary lifestyle and random blood sugar.

Sedentary lifestyle	n	Mean	SD	<i>p-value</i>
High	38	95,58	13,325	0,532
Moderate	92	92,95	8,635	

Based on the results of the statistical calculations of the bivariate analysis in Table 4, the obtained p-value were 0.532 suggest that there was no significant difference between random blood sugar and sedentary lifestyle.

4. DISCUSSION

In this study, the majority of adolescents were in the early adolescent age group, with range of 12-16 years, 75.4% and 62.3% of them are female. Similar results by Retno et al, 2017 showed a highest frequency (57,2%) of stunted adolescent with obesity were found in the age group of 14-15 years.⁸ This is also in line with a study by Maffei C and Gregory, where sedentary behavior is increasing in technologically advanced societies. Similar to findings from previous studies, physical activity decreased with increasing age, whereby ages ≥15 years tended to have more leisure time. Elementary school-age children do a lot of activities outside the home, play with their peers and have a shorter school duration. In contrast with junior high and high school students, with longer school duration, minimum play interaction, and prefer to use gadgets and/or read books at home. Most of their fathers have education level of high school/equivalent as much as 51.5%, work as private sector employees as much as 39.2%, with income between Rp. 2,000,000–4,999,999 in 90% of cases. Increasing income, especially in socio-economic groups in urban areas, results in lifestyle transitions in addition to modern lifestyle with various conveniences resulting in sedentary lifestyles, so that more energy is stored as fat which eventually leads to obesity.

Based on the results of statistical analysis of bivariate analysis, it is shown that the proportion of adolescents with a high sedentary lifestyle and overweight nutritional status (BMI/A) is 28.9%, while adolescents with a moderate sedentary lifestyle and have a nutritional status (BMI/A) who are overweight is 8.7. The p-value in the chi-square test is 0.007, which suggests the presence of significant relationship between sedentary lifestyle and nutritional status (BMI/A) in adolescents in Palembang city. This result concludes that adolescents with high sedentary lifestyle have a 3,33 high risk of overweight compared to those with moderate sedentary lifestyle. (OR=3,33; 95% CI = 1,45-7,62). This finding is also supported by previous study, where sedentary lifestyle is a strong risk factor of both overweight and obesity, where the energy is stored as body fat secondary to the low physical activity.⁹ If this condition persists for a long time, those fat will be accumulated in the abdominal area, both in women and men. Similar findings also found by Syahrul et al.¹⁰ which shows that children who are overweight have a high sedentary lifestyle, defined as playing gadgets for >1 hour was 25.0% compared to normal children with 18.8%. Adolescent sedentary lifestyle and nutritional status are closely correlated, with sedentary behaviors and insufficient physical activity contributing to an increased risk of obesity and other health issues among adolescents.¹¹ A study conducted in Ghana tried to explain this phenomenon by correlating the sedentary behavior of adolescents, such as spending excessive time on the internet and social media platforms, was associated with an increased risk of obesity and cardiovascular diseases.¹² At school, most of the children are lack of physical activity due to not being active in sports, spending most of their recess time sitting, and doing sports activities only about 1-2 times, despite the fact that active lifestyle can reduce body fat and prevent the incidence of obesity in school children.

Most of the energy that come from dietary intake in all age group should be used for physical activity. The lack of physical activity causing most of the energy to be stored as fat, so that people with less activity tend to get overweight. However, this finding is in contrast with a study by Firmansyah et al conducted during COVID-19 pandemic, where during pandemic there were 117 subjects had normal nutritional status, while the least nutritional status found was obese.¹³ Similarly, one study of nutritional status of adolescents during COVID-19 pandemic in Medan city also mostly revealed normal nutritional status with the category "very-thin" was the least found.¹⁴ Normal nutritional status of adolescents during or after a pandemic may be explained by the fact that nutrients are still effectively sufficient to support the process of optimal physical growth, mental development, and working ability, thus maintaining balance between energy intake and energy expenditure.

According to chi-square test, the p-value was 0.041, therefore it can be concluded that there is a significant relationship between sedentary lifestyle and blood pressure of the adolescents in Palembang City, where adolescents with high sedentary lifestyle possess a 2,72 times higher risk of blood pressure >120/80 mmHg compared to those with moderate sedentary lifestyle (OR=2,72; 95% CI=1,14-6,53). Hypertension may results in serious health complications that increase the risk of heart disease, stroke and, worst of all, death.¹⁵ Hypertension consists of 3 stages, namely mild, moderate and severe hypertension, in the range of 90-110 mmHg, 110-130 mmHg and >130 mmHg, respectively. Sedentary lifestyle is one of many factors causing hypertension. Regular physical activity may reduce peripheral resistance therefore reduce blood pressure. The results of this study are in line with a study by Monika et al. which found a significant correlation between sedentary activity and hypertension. The researchers

concluded that individuals with a high sedentary lifestyle are 8.7 times more likely to experience hypertension.¹⁶ Another study also found that adolescents with a sedentary lifestyle > 6 hours/day had a 2.27 times risk of experiencing obese hypertension.¹⁷ Research conducted by Wedri also states that there is a relationship between the level of physical activity and blood pressure in workers.¹⁸ This can be explained that inactive individuals are tend to have a higher heart rate, which over time, the pressure load to the arteries leads to hypertension. It is important to note that sedentary behavior is a modifiable risk factor, and interventions targeting reductions in sedentary time and increases in physical activity have the potential to prevent and manage hypertension in adolescents.¹⁹ Adequate physical activity, healthy lifestyle, including healthy dietary pattern, and proper sleep are hoped to prevent hypertension, especially during COVID-19 pandemic.²⁰ On the other hand, there was no significant difference between random blood sugar at the time of sedentary lifestyle. Future research may more precisely use fasting blood glucose levels, and consider the time spent and dietary patterns.

5. CONCLUSION

This study shows a significant relationship between sedentary lifestyle and nutritional status (BMI/A) of adolescents in Palembang City, where adolescents with a high sedentary lifestyle have a 3.33 times higher risk of having an overweight nutritional status (BMI/A) compared to those with moderate sedentary lifestyle. There is also a significant relationship between a sedentary lifestyle and blood pressure of adolescents in Palembang City. Meanwhile, there was no significant difference between the sedentary lifestyle and blood glucose levels at the time.

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