World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-26, September 2023
ISSN: 2749-3644

THE RELATIONSHIP OF PHYSICAL ACTIVITY, GADGET USE, AND SLEEP TIME TO ADOLESCENT OBESITY

Anwar Pasaribu, Sunarto Kadir , Flora Ninta Tarigan, Irwan
Department of Public Health, Postgraduate, Gorontalo State University, Gorontalo Indonesia
anwarpasaribu16361@gmail.com
sunartokadir@ung.ac.id; flora.tarigan@ung.ac.id

Article history:
Received: July 28th 2023
Accepted: August 28th 2023
Published: September 28th 2023

Abstract:
Overweight and obesity are a global health problem for both children and adults. The highest number of overweight and obese people in Gorontalo Province in 2017, in all age groups, was highest in Gorontalo City. This study aims to determine the relationship between physical activity, gadget use, and sleep time. This type of research uses a quantitative method with Observational analysis with a Cross-Sectional research design using the Spearman test. The population included in the study were all SMA Negeri 2 Kota Gorontalo students, totaling 1149 students. Sampling was carried out non-randomly using a purposive sampling technique determined using the Slovin formula. So, the sample size for this study was 92 students. The research showed an influence between physical activity and obesity in adolescents with a P-value = 0.010 (<0.05). Based on the results of the study at SMA N 2 Gorontalo City, it was found that there was an influence between playing gadgets and the incidence of obesity in adolescents with a P-value = 0.009 (<0.05). Based on the results of research at SMA N 2 Gorontalo City, it was found that there was an influence between sleep time and the incidence of obesity in adolescents with a P-value = 0.000 (<0.05). The conclusion is that physical activity, use of gadgets, and sleep time are related to obesity in adolescents.

Keywords: Obesity, Physical activity, Use of Gadgets, Bedtime.

INTRODUCTION

The current era of globalization and technological sophistication has caused children and adolescents to play with more gadgets, eat food and drink ready-to-eat drinks through online shopping; coupled with the conditions of the Covid-19 pandemic in the last two years, teenagers have to be at home, causing their physical activity to be very high. It decreases while the frequency of eating increases, causing children and adolescents to tend to become obese, which can result in Non-Communicable Diseases (PTM) (Sinulingga et al., 2021).

Overweight and obesity are a global health problem for both children and adults. In 2015, the WHO declared obesity to be at an epidemic level, which, if left unchecked, would become global obesity. At least 600 million of the 19 billion adults in the world will be obese. WHO projects that in 2015, there will be 2.3 billion adults who are overweight, and more than 700 million will be obese. In the United States, according to the American Obesity Association, obesity rates in children and adolescents continue to increase. In Indonesia, the prevalence of obesity increased to 27.1% in 2013 in adults and 8.8% in children aged 5-12 years (Bowen et al., 2018).

The highest number of overweight and obese people in Gorontalo Province in 2017, in all age groups, was highest in Gorontalo City. The results of Riskesdas (2017) show that the rate of overweight in girls aged 6/7 to 12/13 years reaches 6.2 percent, and in boys, it reaches 12.3 percent. In men over the age of 15 years, the prevalence of overweight reaches 28.9 percent, and in women, it comes 39.7 percent (Gorontalo Provincial Health Office, 2014).

The main factor causing obesity is unhealthy eating patterns, with excessive intake of nutrients. Restaurants, cafes, and fast food are delicious. Food from this environment presents high calories or fat and tends to have low nutrition, especially if it is not balanced with activities that burn calories, such as fat forming faster (Kadir, 2019). To burn calories, regular and continuous exercise is beneficial. This aligns with research conducted by Sembiring (2019) on the rest of SMA Negeri 2 Binjai. The study's results stated that there was a relationship between sports activities in terms of type, frequency, and duration of exercise and

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-26, September 2023
ISSN: 2749-3644

the incidence of obesity. Based on the problems described above, this study aimed to determine the relationship between physical activity, gadget use, and sleep time on the incidence of adolescent obesity.

METHODS

This research will be conducted at SMA Negeri 2 Gorontalo City. The study was carried out for 2 (two) months in November - December, which consisted of the data collection stage and the research data analysis stage. This type of research uses a quantitative method with Observational Analytic with a Cross-Sectional research design. This analysis shows the strong relationship of each independent variable to the incidence of obesity in high school children. Each independent variable is analyzed separately for the dependent variable (effect). Bivariate analysis was performed to determine the correlation of the dependent and independent variables using the computerized SPSS program with the Spearman correlation test. The population included in the study were all SMA Negeri 2 Kota Gorontalo students, totaling 1149 students. Sampling was carried out non-randomly using a purposive sampling technique determined using the Slovin formula. So, the sample size for this study was 92 students.

RESULTS AND DISCUSSION

Table 1. Analysis of the Relationship between Physical Activity and Body Mass Index in Adolescents at SMA N 2 Gorontalo City

Physical Activity	Body Mass Index (BMI)				Total		*P-values*
	Obesity		Not Obese				
	n	%	n	%	n	%	
Light	44	66,7	10	38.5	54	58,7	**0.010**
Currently	17	25,8	11	42,3	28	30,4	
Heavy	5	7,6	5	19,2	10	10,9	
Total	**66**	**100.0**	**26**	**100.0**	**92**	**100**	

Source : Primary Data, 2022

Table 1 shows physical activity data based on body mass index in adolescents at SMA N 2 Kota Gorontalo. The highest physical activity with obesity was light physical activity with 44 people (66.7%), and the lowest with obesity was heavy physical activity with 5 people (7.6%). While the highest level of physical activity for those who were not obese was moderate physical activity, namely 10 people (38.5 %), the lowest level for those who were not obese was heavy physical activity, namely 5 people (19.2%). The results show that adolescents with mild physical activity are more likely to be obese than adolescents with strenuous physical activity levels. Spearman test value obtained P-value = 0.010 (< 0.05), meaning that a significant relationship exists between physical activity and the incidence of obesity in adolescents at SMA N 2 Gorontalo City.

Table 2. Analysis of Gadget Usage Relationships With Body Mass Index in Adolescents at SMA N 2 Gorontalo City

Play Gadgets	Body Mass Index (BMI)				Total		*P-values*
	Obesity		Not Obese				
	n	%	n	%	n	%	
High risk	47	71,2	11	31.8	58	63.0	**0.009**
Low Risk	19	28,8	15	68,2	34	37.0	
Total	**66**	**100.0**	**26**	**100.0**	**92**	**100**	

Source : Primary Data, 2022

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-26, September 2023
ISSN: 2749-3644

Table 2 obtained data on the risk of using gadgets based on Body Mass Index in adolescents at SMA N 2 Kota Gorontalo. The highest gadget use activity with obesity is high risk, with a total of 47 people (71.2 %); the lowest risk level of using gadgets who are obese is low risk, with a total of 19 people (28.8%). While the highest risk level for using devices that are not obese is a low risk, namely 15 people (57.7 %), the most minor risk level for using gadgets that are not obese is a high risk, 11 people (42.3%). The results show that adolescents with high-risk gadget use are more likely to be obese than adolescents with low-risk gadget use. Spearman test value obtained P-value = 0.009 (< 0.05), meaning that a significant relationship exists between physical activity and the incidence of obesity in adolescents at SMA N 2 Gorontalo City.

Table 3. Analysis of the Relationship between Sleep Time and Body Mass Index in Adolescents at SMA N 2 Gorontalo City

Sleeping time	Body Mass Index (BMI)				Total		*P-values*
	Obesity		Not Obese				
	n	%	n	%	n	%	
High risk	54	81.8	10	38.5	64	69,6	**0.000**
Moderate Risk	12	18,2	16	61.5	28	30,4	
Total	**66**	**100.0**	**22**	**100.0**	**92**	**100**	

Source : Primary Data, 2022

Table 3 obtained data on sleep time based on Body Mass Index in adolescents at SMA N 2 Kota Gorontalo. The highest sleeping time with obesity is the sleeping time in the high category, with a total of 54 people (81.8%); the lowest sleeping time with obesity is the sleeping time in the common sort, with 12 people (18.2%). While the highest level of sleep time for those who are not obese is the low category of sleep time, 16 people (61.5%), the lowest level of sleep time for those who are not obese is the high category of sleep time, namely 10 people (38.5%). The results show that adolescents with a high variety of allowance are more obese than adolescents with a low allowance category. Spearman test value obtained P-value = 0.000 (< 0.05), meaning that there is a significant and significant relationship between the level of the allowance category and the incidence of obesity in adolescents at SMA N 2 Kota Gorontalo.

The Relationship between Physical Activity and the Incidence of Obesity in Adolescents

The study results found that the highest category of physical activity that was obese was pocket money, with a high category of 44 people (66.7 %). In comparison, the least was physical activity in the heavy category of 5 people (7.6%). Based on the results of hypothesis testing using the Spearman test, P-value = 0.010 (< 0.05) means a significant relationship exists between physical activity and the incidence of obesity in adolescents at SMA N 2 Gorontalo City.

The sophistication of technology, such as television and computers, causes many children to fixate on it so that they do not play games that involve physical activities such as playing bicycles. Watching television consumes very few calories and adds calories because you eat snacks while watching. Security conditions do not guarantee that many parents do not allow their children to play sports or on the field outside. Limited school space means that many schools need more playing fields for their students to carry out physical activities (Listiyana et al., 2013).

Lack of movement will cause a great cycle; obesity makes sports activities difficult and less enjoyable, and lack of exercise will indirectly affect the decrease in the person's basal metabolism. So training is crucial in weight loss not only because it burns calories but also because it can help regulate normal metabolic functioning. (Hadina et al., 2022)

Previous researchers do this based on the results of bivariate analysis. It is known that 60.4% of school children do moderate-severe physical activity > 1 hour/day. Fisher's test results show a relationship between physical activity and the incidence of obesity in children, as evidenced by a value of p=0.009 (1 hour/day) (Zamzani et al., 2017).

The Relationship between Gadget Use and Obesity in Adolescents

From the results of the study, it was found that the

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-26, September 2023
ISSN: 2749-3644

highest use of gadgets who were obese was in the high category, as many as 47 people (71.2 %), while the least was the use of devices in the low class, namely as many as 19 people (28.8%). Based on the results of hypothesis testing using the Spearman test, P-value = 0.009 (< 0.05) means a significant relationship exists between the use of gadgets and the incidence of obesity in adolescents at SMA N 2 Gorontalo City.

Advances in device technology make children lazy to do active activities because they will be interested in spending some time on passive activities. Lack of physical activity and exercise can reduce muscle mass and increase body fat mass. Children who use gadgets for a long time can increase the risk of obesity, sleep disorders, and even mental illness because using gadgets causes obesity if using devices in the long term. Therefore, this can be overcome by supervising children aged 6 to 18 years for 2 hours and a time limit per day and maintaining other activities through physical activity such as sports, walking, running, and so on (Kusumawati et al., 2020).

This theory aligns with research conducted for a long time in obese children, as much as 32.0 % (n = 24), with an average duration of using gadgets daily, 3 hours 48 minutes. The results of the chi-square test analysis of the relationship between the time of gadget use and obesity obtained a value of p = 0.000; this indicates that there is a significant relationship between the duration of gadget use and obesity (Kusumawati et al., 2020).

The Relationship between Sleep Time and the Incidence of Obesity in Adolescents

From the results of the study, it was found that the highest category of sleep time that was obese was the high category of sleep with 54 people (81.8 %), while the least sleep time was the medium category, namely 12 people (18.2%). Based on the results of hypothesis testing using the Spearman test, P-value = 0.000 (< 0.05) means a significant relationship exists between sleep time and the incidence of obesity in adolescents at SMA N 2 Gorontalo City.

Those who usually sleep 5 hours/day are known to have 15% more ghrelin than those who sleep 8 hours. Those who slept 5 hours also had 15% less leptin. These hormonal changes cause increased hunger and make people quickly look for food. Taheri, who led the study, said: " We found that those who slept less had lower leptin levels and higher ghrelin levels ." This condition will increase appetite, and because food is easy to find everywhere, this triggers obesity. Individuals who sleep less than 8 hours are shown to have a greater chance of being obese. Good sleep and a healthy lifestyle are essential to fight obesity (Suraya et al., 2021).

Other research also shows that short sleep time can cause eating habits to be disturbed from 3 times a day to less or more often, high levels of snack intake and high-calorie foods at night. So even though the impact of sleeping time is small, if it is done continuously, it will cause an increase in the incidence of obesity (Dashti et al., 2015).

The findings from this study indicate that there is a relationship between sleep patterns and obesity in children aged 10-18 years in the working area of the Payo Selincah Health Center; the p-value obtained is (PR = 1.92 95 % CI = 1.16-3.16 p- value=0.01).

CONCLUSIONS

This study concludes that a relationship exists between physical activity, gadget use, and sleep time on the incidence of obesity in adolescents.

REFERENCES

1. Bowen, L., Taylor, AE, Sullivan, R., Ebrahim, S., Kinra, S., Krishna, KR, Kulkarni, B., Ben-Shlomo, Y., Ekelund, U., Wells, JC, & Kuper, H. (2018). Associations between diet, physical activity, and body fat distribution: A cross-sectional study in an Indian population. BMC Public Health, 15 (1). https://doi.org/10.1186/s12889-015-1550-7
2. Gorontalo Provincial Health Office. (2014). Gorontalo Province Basic Health Research Result Book 2013. Gorontalo.
3. Kadir, S. (2019). Relationship between Intake of Macronutrients from Breakfast and Student Nutritional Status. Jambura Journal of Health Sciences and Research, 1 (1), 1–6. https://doi.org/10.35971/jjhsr.v1i1.1783
4. Sembiring, TNS (2019). No Title. The Relationship between Sports Activities and Overnutrition and Obesity in Adolescents.
5. Listiyana, AD, Mardiana, M., & Prameswari, GN (2013). Central obesity and total blood cholesterol levels. Journal of Public Health, 9 (1), 37–43.
6. Hadina, H., Hadriani, H., Nirma, N., Mangun, M., & Sakti, PM (2022). EXCLUSIVE BREASTFEEDING FOR WORKING MOTHERS AND WORKPLACE LEADERSHIP SUPPORT. Jambura Journal of Health Sciences and Research, 4, 90–98. https://doi.org/10.35971/jjhsr.v4i0.13384
7. Zamzani, M., Hadi, H., & Astiti, D. (2017). Physical activity is associated with the incidence of obesity in elementary school children. Indonesian Journal of Nutrition and Dietetics (Indonesian Journal of Nutrition and

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-26, September 2023
ISSN: 2749-3644

Dietetics), 4 (3), 123. https://doi.org/10.21927/ijnd.2016.4(3).123-128

8. Kusumawati, E., Fathurrahman, T., & Tizar, ES (2020). Relationship between fast food eating habits, duration of gadget use, and family history of obesity in school-age children (study at SDN 84 Kendari). Journal of Medicine & Health, 6 (2), 87–92.
9. Suraya, R., Nababan, ASV, Siagian, A., & Lubis, Z. (2021). The Effect of Snack Food Consumption, Physical Activity, Screen Time, and Sleep Duration on Obesity in Adolescents. World Journal of Nutrition, 3 (2), 80–87. https://doi.org/10.33085/jdg.v3i2.4732
10. Dashti, HS, Scheer, FA, Jacques, PF, Lamon-Fava, S., & Ordovás, JM (2015). Short Sleep Duration and Dietary Intake: Epidemiologic Evidence, Mechanisms, and Health Implications. Advances in Nutrition, 6 (6), 648–659. https://doi.org/10.3945/an.115.008623
11. Waluyani, I., Siregar, F. N., Anggreini, D., Aminuddin, A., & Yusuf, M. U. (2022). Pengaruh Pengetahuan, Pola Makan, dan Aktivitas Fisik Remaja Terhadap Status Gizi di SMPN 31 Medan, Kecamatan Medan Tuntungan. PubHealth Jurnal Kesehatan Masyarakat, 1(1), 28–35. https://doi.org/10.56211/pubhealth.v1i1.31
12. Wan Dali, W. P. E., Jan Mohamed, H. J., & Yusoff, H. (2018). Nutrient intakes status and physical inactivity among overweight and obese school children in Kota Bharu, Kelantan, Malaysia. Iranian Journal of Public Health, 47(8), 1098–1107.
13. Wardhani, Y. F., & Paramita, A. (2016). Pelayanan kesehatan mental dalam hubungannya dengan disabilitas dan gaya hidup masyarakat Indonesia (analisis lanjut Riskesdas 2007 dan 2013). Buletin Penelitian Sistem Kesehatan, 19(1), 99–107.
14. Widyasmara, F. (2019). Faktor Determinan Kejadian Obesitas Pada Remaja di SMA Negeri 9 Semarang.
15. Yland, J., Guan, S., Emanuele, E., & Hale, L. (2015). Interactive vs passive screen time and nighttime sleep duration among school-aged children. In Sleep Health (Vol. 1, Issue 3, pp. 191–196). https://doi.org/10.1016/j.sleh.2015.06.007
16. Yuliana, Y., & Winarno, M. (2022). Hubungan Aktivitas Fisik dan Pola Makan Terhadap Status Obesitas Pada Siswa Sekolah Menengah Pertama. In Sport Science and Health (Vol. 2, Issue 6, pp. 301–311). https://doi.org/10.17977/um062v2i62020p301-311
17. Lubis, M. Y., Hermawan, D., Febriani, U., & Farich, A. (2020). Hubungan Antara Faktor Keturunan, Jenis Kelamin Dan Tingkat Sosial Ekonomi Orang Tua Dengan Kejadian Obesitas Pada Mahasiswa Di Universitas Malahayati Tahun 2020. Human Care Journal, 5(4), 891. https://doi.org/10.32883/hcj.v5i4.744
18. Mardiana, Yusup, M., & Sriwiyanti. (2022). HUBUNGAN BEBERAPA FAKTOR DENGAN KEJADIAN OBESITAS REMAJA DI PALEMBANG THE RELATIONSHIP OF SOME FACTORS WITH THE EVENT OF ADOLESCENT Poltekkes Kemenkes Palembang (email penulis korespondensi : mardianaagus42@yahoo.com). 17(1), 63–70.
19. Marsal, A., & Hidayati, F. (2017). Pengaruh Smartphone Dengan Interaksi Sosial. Jurnal Ilmiyah Rekayasa Dan Manajemen Sistem Informasi, 3(1), 78–84.
20. Mifta Ayu Firmanda, Mila Kristiani, Fida, H. (2021). Hubungan Intensitas Penggunaan Gadget terhadap Status Gizi pada Siswa SMK Batik 2 Surakarta. 2, 20–25.
21. Mokolensang, O. G., Manampiring, A. E., & . F. (2016). Hubungan Pola Makan Dan Obesitas Pada Remaja Di Kota Bitung. Jurnal E-Biomedik, 4(1). https://doi.org/10.35790/ebm.4.1.2016.10848
22. Nilasari, G. E., Setiawan, H., & Wuryanto, A. (2016). Faktor-Faktor Gaya Hidup Yang Berhubungan Dengan Obesitas Anak Sekolah Dasar Swasta Bernardus Dan Hj Isriati Kelas 4-6 Di Semarang. Jurnal Kesehatan Masyarakat (e-Journal), 3(April), 1–23.