

The relationship between sedentary life and diet with obesity incidence in adolescent at Wachid Hasyim High School 2 Taman Sidoarjo

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ABSTRACT

Obesity is a problem that is quite troubling among adolescents (Proverawati, 2010 in Wulandari, et al, 2017). Obese adolescents throughout their lives have a higher risk of suffering from a number of serious health problems such as hypertension, cardiovascular disease, diabetes mellitus, cancer, osteoporosis, stroke, and others that have implications for reducing productivity and life expectancy (Ministry of Health RI, 2018). Factors causing obesity in adolescents are suspected to come from the adolescent diet, including not always having breakfast (65.2%), lack of consumption of vegetable and fruit fiber (93.6%) and frequent consumption of flavorful foods (75.7%), consuming large portions of food, eating high energy, high fat, high simple carbohydrates and low fiber, do less physical activity (42.5%). This study aims to analyze the relationship between sedentary lifestyle and diet with the incidence of obesity in adolescents at Wachid Hasyim 2 Taman Sidoarjo High School. This study is with a cross-sectional design, a large sample of 108 students taken by simple random sampling, data analysis using fisher exact test with a $\alpha = 0.05$. The results showed that there was no relationship between sedentary lifestyle and obesity ($p = 0,468$), there was no relationship between diet and obesity ($p = 0.479$). It is recommended that students can balance by doing physical activities that expend a lot of energy and maintain a healthy diet and the school can carry out health promotion in the form of posters or banners about sedentary lifestyle and diet.

Keywords: sedentary life, diet , obesity

BACKGROUND

The World Health Organization (WHO) says the childhood and adolescent obesity epidemic can no longer be underestimated. The latest data states that over a period of 40 years the population of children and adolescents in the world who are obese has increased 10 times from 11 million to 120 million (Ezzati M, 2017). Obesity or commonly known as overweight is a problem that is quite troubling among adolescents (Wulandari, S. et al, 2017). Obese adolescents throughout their lives have a higher risk of suffering from a number of serious health problems such as hypertension, cardiovascular disease, diabetes mellitus, cancer, osteoporosis, stroke, and others that have implications for reducing productivity and life expectancy. Obesity in adolescents also has an impact on the mental health of adolescents Obese adolescents can also experience stigmatization, poor body image, and low self-esteem further increasing their susceptibility to depression. . About 80% of obese adolescents with psychiatric and psychosocial problems are likely to continue to experience mental disorders into adulthood.

Some studies have found a link between obesity and mental health problems, such as depression, suicidal ideation, and suicide attempts, anxiety, behavioral problems, low self-esteem, and poor self-image . Obese adolescents can also experience stigmatization, poor body image, and low self-esteem further increasing their susceptibility to depression. The prevalence of obesity (Body Mass Index or BMI $\geq 25 - 27$) in Indonesia based on SIRKESNAS data in 2016, was 33.5%. In obese adolescents, the prevalence was higher in

women by 41.4% when compared to men by 24.0%. In East Java in 2018 the prevalence of obesity increased by 16% or as many as 1,163,118 population. In adolescents aged 13-15 years by 6.0%, in adolescents aged 16-18 years by 5.1% (Ministry of Health, RI. 2018). According to the health profile of the City of Surabaya in 2016, when weight measurements were taken for obesity examination, it was found that there were 3.58% of obese people. In 2017 it experienced an increase of 24.02%. In 2018, those affected by obesity in adolescents and adults were 15.51% or as many as 163,036 with male proprosy of 56,656 people 14.65% and women as many as 106,380 people 16.01% (Ministry of Health RI, 2016). In Sidoarjo Regency in 2017 the prevalence of obesity in adolescents and adults was 7.49% or as many as 37,089 population with a proportion of men of 5.9% or as many as 11,878 residents and women as much as 8.57% or as many as 25,211 residents (Sidoarjo Health Office, 2017). In 2018 the prevalence of obesity in adolescents and adults in Sidoarjo Regency increased by 37.80% or as many as 98,442 population with a proportion of men of 12.29% or as many as 31,752 residents, and women as much as 17.11% or as many as 66,870 residents (Sidoarjo Health Office, 2018). Based on data from the Global School Health Survey in 2015, it is stated that the main causes of obesity in adolescents include not always having breakfast (65.2%), most adolescents consume less fruit vegetable fiber (93.6%) and often consume delicious foods (75.7%). In addition, adolescents also tend to apply sedentary life patterns, resulting in less physical activity (42.5%) . Diet is an arrangement of the type and amount of food consumed by a person or group of people at a certain time consisting of the frequency of eating, the type of food and the portion of food (Tussakinah, Masrul, & Burhan, 2018). The diet that is the trigger for obesity is consuming large portions of food (exceeding the needs), eating high energy, high fat, high in simple carbohydrates and low in fiber. The impact of obesity is quite widespread on various degenerative chronic diseases such as hypertension, coronary heart disease, stroke, cancer and type 2 diabetes mellitus as well as bone disorders. Due to the many diseases that can be caused by obesity so that the morbidity and mortality rate of obese people is quite high (Siedel & Vischer, 2009 in Masrul, 2018). In addition, adolescents also tend to apply sedentary life patterns so that they do less physical activity (42.5%). (<https://indonesiabaik.id/infografis/obesitas-ancam-remaja>). Sedentary lifestyle is an activity related to energy expenditure ≤ 1.5 metabolic equivalents (METs), such as sitting, lying down/ lying down, watching television, playing games, playing laptops and gadget (Mandriyarini, 2017). This study aims to analyze the relationship between sedentary lifestyle and diet with the incidence of obesity in adolescents at Wachid Hasyim 2 Taman Sidoarjo High School.

RESEARCH METHODS

The method used in this study was an analytical observational study that analyzed the relationship of life habits (sedentary lifestyle) and diet with the incidence of obesity in adolescents at Wachid Hasyim 2 Taman High School. The study population was intensive students of Wachid Hasyim 2 Taman Sidoarjo High School with a total of 150 students, and the research sample was some of the intensive students of Wachid Hasyim 2 Taman Sidoarjo High School totaling 108 people. The sampling technique uses a simple random sampling technique, which is a sampling technique based on the opportunity to be selected or not selected as a sample (Nursalam, 2017 in Mukamala, 2019). Data collection online through google form using questionnaires that have previously been carried out validity y tests and reliability tests. Data analysis using chi square test to determine the relationship between variables (Hastono, 2016)

RESULTS

The results showed that of the 108 adolescent intensive students of Wachid Hasyim 2 Taman High School, there were 15 students (15%) aged 15 years, 42 students (39%) aged 16 years, and 17 students (51%) aged 17 years. The gender of adolescents of intensive students of SMA Wachid Hasyim 2 Taman Sidoarjo shows that as many as 27 teenagers (25%) are male and 81 teenagers (75%) are female.

Tabel 1 : Age, Gender of Teenagers at Wachid Hasyim High School 2 Taman Sidoarjo for the period of May 2021

Characteristic	Sum (n)	Percentage (%)	Total	
			Amount	Percentage
<i>Age</i>				
15 years old	15	14	108	100
16 years old	42	39		
17 years old	51	47		
<i>Sex</i>				
Male	27	25	108	100
Female	81	75		

Sedentary lifestyle, diet and incidence of obesity in adolescents at SMA Wachid Hasyim 2 Taman Sidoarjo

The results showed that 44 adolescents or less than half (41%) had a high (sedentary lifestyle) and 64 adolescents or more than half (59%) had a low (sedentary lifestyle). The results of the study on diet showed that more than half (61%) of respondents had a healthy diet and less than half (42%) had an unhealthy diet. The results of a study on the incidence of obesity showed that 8 adolescents or a small part (7%) experienced obesity events and 100 adolescents or almost all (93%) did not experience obesity events.

Furthermore, data on sedentary lifestyle, diet and obesity incidence can be seen in the following table:

Table 2: Sedentary lifestyle, diet and incidence of obesity in adolescents at Wachid Hasyim High School 2 Taman Sidoarjo for the period of May 2021.

Characteristic	Sum (n)	Percentage (%)	Total	
			Amount	Percentage
<i>Sedentary lifestyle</i>				
High	44	41	108	100
Low	64	59		
<i>Eating Patern</i>				
Healthy	66	61	108	100
Unhealthy	42	39		
<i>Incidence of Obesity</i>				
Obesity	8	7	108	100
Non Obesity	100	93		

The relationship of sedentary lifestyle with obesity.

Table 3. The Relationship between Sedentary lifestyle and obesity incidence in adolescents at Wachid Hasyim High School 2 Taman Sidoarjo for the period of May 2021.

<i>Sedentary lifestyle</i>	Obesity incidence				Total	
	Obesity		Non Obesity		F	%
	F	%	F	%		
High	2	4.5	42	95.5	44	100
Low	6	9.4	58	90.6	64	100
Total	8	7.4	100	92.6	108	100
Fisher exact test	p= .468					

The results of the fisher exact test obtained the number $p = 0.468$ ($p > 0.05$), meaning that there was no significant relationship between life habits (Sedentary Lifestyle) and the incidence of obesity in adolescents at SMA Wachid Hasyim 2 Taman Sidoarjo.

Relationship of diet with the incidence of obesity

Table 4. The Relationship between Diet and obesity incidence in adolescents at Wachid Hasyim High School 2 Taman Sidoarjo for the period of May 2021.

Diet	Obesity				Total	
	Obesity		Non Obesity		F	%
	F	%	F	%		
Healthy	6	9.1	60	90.9	66	100
Unhealthy	2	4.8	40	95.2	42	100
Total	8	7.4	100	92.6	108	100
Fisher exact test	p=.479					

The results of the fisher exact test obtained the number $p= 0.479$ ($p > 0.05$), meaning that there was no significant relationship between diet and the incidence of obesity in adolescents at SMA Wachid Hasyim 2 Taman Sidoarjo.

DISCUSSION

Sedentary lifestyle

The results showed that less than half (41%) of teenagers of Wachid Hasyim 2 Taman Sidoarjo High School have a high sedentary lifestyle. The results of this study are not much different from the results of a study conducted by Boulhana A, et al, which showed that 40.4% of adolescents had sedentary behaviors (Boulhana, A, Anarghou,H, Ibour,S, Najimi,M, &Chigr,F, 2021). Research conducted by Nascente, et al showed different results where 66.8% of schoolchildren had sedentary life behavior (Nascente, et al, 2016) . In modern times today most individuals facilitate themselves with various electronic devices such as cellphones (gadget) and computers / laptops both adults and teenagers. These facilities are used to access the internet and social media which results in low energy because in general playing gadget is done without moving other limbs besides fingers. The above activities are light activities that are at risk of causing obesity. Obesity is the accumulation of

fat that occurs in a person's body excessively or is said to be with a body weight that exceeds normal limits (Fajannah, 2018). Sedentary lifestyle causes excess calories and fat accumulation in the body. The maintenance of body weight depends on the number of calories absorbed through food, physical activity and metabolism. a person with such behavior can store a lot of calories and expend only a little energy, causing obesity. Frazier RS (2021) stated that there are eight (8) signs felt in the body due to sedentary life, namely: experiencing general health problems, being lazy to move for more than half an hour, always feeling tired, changes in body weight and body metabolism, feeling confused, sleep quality disorders and mental health disorders.

The results of this study show that adolescents most often do sedentary lifestyle is playing gadget and the habit of lying down / lying down in bed. based on a study, the use of gadget is associated with low physical activity and high body mass index. This is due to the low energy because in general playing gadget is done without moving other limbs besides fingers. Teenagers perform these behaviors in a sitting position, sometimes most teenagers do them in a lying down position, so that the energy released is lower. If the condition persists continuously, it can be at risk of causing obesity. Therefore, adolescents must balance physical activities that require a lot of energy such as exercise, cleaning the house, reducing sitting leisurely activities, lying down to create energy balance in the body and launch the fat oxidation process so as to reduce the chances of obesity.

Diet

The results of this study found that less than half of 42 adolescents (39%) had an unhealthy diet. Dietary measurements are categorized into 3 groups, namely percentage data on each component, namely the eating menu (50%), frequency of meals (20%), portions of food (30%). In the frequency component of eating, namely the statement about "Eat 3 times a day (excluding interlude foods)" more than half of adolescents (51%) gave the answer "sometimes". The frequency of meals is how many meals a day (3 times) namely breakfast, lunch and dinner (Ministry of Health RI, 2014). Research on the diet of adolescents in schools in Ghana showed results that were no different from the results of this study, namely that 57% of students did not eat breakfast before going to school and as many as 50% of students were irregular in consuming vegetables and fruits. (Hormenu, 2022). Healthy diets recommended for adolescents include: eat 3 times a day plus healthy snacks, increase protein consumption and reduce fat in the diet, increase consumption of vegetables and fruits, reduce salt and drinks containing high sugar levels, increase consumption of water to prevent dehydration, According to Meilan, Maryanah and Follona (2018) the impact of an unhealthy diet is to be overweight, and increase the risk of developing various diseases including diabetes, heart disease and cancer.

To improve their health and prevent the occurrence of various diseases, adolescents must maintain a healthy diet by eating 3 meals a day, namely morning, afternoon and night, as well as consuming foods that contain balanced nutrition consisting of carbohidrat, vegetables, milk, and protein.

Incidence of Obesity

The results showed that a small percentage (7%) were obese, and almost all respondents (93%) were not obese. The results that are not much different are shown by a study conducted by Mulyani NS, et al (2020) which said that there are fewer adolescent girls who are obese than those who are not obese. Research on the prevalence of obesity in children conducted in 2019, showed different results from this study where the prevalence of obesity in children was 56.25% (Nila WB, et al, 2019).

According to Sari (2019) obesity is affected by several factors, some of these factors include physical activity factors and dietary factors. Overweight and obesity occur as a result of energy intake higher than the energy expended. A less active person needs a small amount of calories compared to a person with high activity. Sedentary lifestyle behavior or not doing balanced physical activity and consuming a lot of foods high in calories and fat, avoiding eating breakfast so as to increase the portion of lunch and dinner, often consuming unhealthy snacks, eating in large quantities and in a short time, overeating (large portions), and eating frequently (eating irregularly) will tend to be obese.

The cause of obesity in this study was the lack of physical activity carried out by adolescents, where adolescents tended to carry out life habits (sedentary lifestyle) and unhealthy diets. Research shows that there are several factors related to the incidence of obesity, including high socioeconomic status, consumption of soft drinks, lack of physical activity, sedentary life behavior and lack of knowledge about nutrition (Kedir S, et al, 2022). Therefore, adolescents can balance between sedentary lifestyle and diet, by continuing to carry out activities that require a lot of energy such as exercise, cleaning the house and managing diet, while maintaining a regular frequency of meals as much as 3 times a day (breakfast, lunch, dinner).

The Relationship between Sedentary Lifestyle and Obesity Incidence

The results of the chisquare statistical test showed that there was no significant relationship between life habits (Sedentary Lifestyle) and the incidence of obesity in adolescents at Wachid Hasyim 2 Taman Sidoarjo High School. The results of this study are in line with similar studies conducted by Sinulingga PA, et al which showed that there was no relationship between knowledge and sedentary behavior at risk of obesity in adolescents in the city of Medan (Asyera, et al, 2021) . The findings of this study are also in line with a study conducted by Wismoyo Nugraha Putra entitled "The Relationship between Diet, Physical Activity and Sedentary Activity with Overweight at SMA Negeri 5 Surabaya" which stated that there was no relationship between sedentary activity and overweight. Different results are shown by research conducted by Kedir, et al (2022) which says there is a significant relationship between sedentarylife behavior and the incidence of obesity (Kedir S,et al, 2022).

Sedentary lifestyle is the habit of a person who does not do much physical activity or does not do much movement. Sedentary lifestyle is related to activity at the level of resting physical activity or is one of the light activities with energy expenditure equivalent to 1-1.5 metabolic equivalent (METs). (Puspasari I, et al, 2017). According to Setiawati, et al (2019) during the pandemic, the overall lifestyle situation has changed with more activities at home, fast food consumption becomes higher, boredom is also increasing so that it invites someone to dive deeper into the internet by using a gadget or laptop and looking for other entertainment that causes physical activity can be lower so that energy use becomes less and triggers weight gain.

Adolescents with high sedentary life behaviors tend to be interspersed with frequent consumption of foods that cause a buildup of fat in the body. In addition, another possibility of obesity in adolescents is having an obese family background. This can be reduced by interspersed physical activity that expends a lot of energy. Physical activity is defined as the movement of the body, especially muscles that require energy and exercise is a form of physical activity. Low physical activity is the main factor causing obesity, where someone who does not regularly do sports has a risk of obesity of 1.35 times compared to someone who exercises regularly (Mulyani NS, et al, 2020).

The Relationship Of Diet With Obesity

The results showed that there was no relationship between diet and the incidence of obesity in adolescents at Wachid Hasyim 2 Taman Sidoarjo High School. The results of this study are in line with research conducted by Nuryani, et al in 2021 which stated that there was no significant relationship between diet and the incidence of obesity in adults in Gorontalo Regency, Indonesia. In contrast to the research conducted by Putra (2017) at SMA Negeri 5 Surabaya entitled "The Relationship between Diet, Physical Activity and Sedentary Activity with Overweight at SMA Negeri 5 Surabaya" which stated that there was a significant relationship between diet and the incidence of overweight in SMA Negeri 5 Surabaya students. Different results were also shown in a study conducted by Yuliana and Winarno ME (2020) which stated that there was a significant relationship between diet and obesity status in Junior High School students (Yuliana, Winarno ME, 2020).

The results of this study also show that there are adolescents who are not obese but tend to have an unhealthy diet. This is likely because the teenager has high activity or is actively moving which can increase energy use or metabolic processes increase so that the fat burning process increases which eventually fat is not stored in the body. Other factors can be caused by the body's metabolic hormone factors, because the body's metabolic processes are fast so that food can be processed into energy and not become fat cells. The results of the study also show that there are some obese adolescents but have a healthy diet This can be caused by a family history of obesity. According to Proverawati (2010) in Sari, et al (2019) Gene or hereditary factors affect a person's talent to become obese. The presence of mutations in genes causes abnormalities of brain receptors to food intake characterized by the ability to increase or inhibit food intake. Gene transcription factors can influence the formation of fat cells on a person's nutritional status so that individuals who come from obese families have a 2 – 8 times greater probability of obesity compared to families who are not obese.

The absence of an association between diet and the incidence of obesity in this study is likely due to many other factors related to obesity which include lifestyle, hereditary or genetic factors, development, age increase, lack of sleep, stress and certain diseases.

CONCLUSION AND RECOMMENDATION

The results showed that there was no significant relationship between sedentary lifestyle and the incidence of obesity in adolescents at Wachid Hasyim 2 Taman Sidoarjo High School. There was no significant relationship between diet and the incidence of obesity in adolescents at Wachid Hasyim High School 2 Taman Sidoarjo. This research is useful for increasing adolescent awareness to reduce sedentary life and carry out a healthy diet. It is necessary to conduct further research on different samples with a balanced sample size between obese adolescents and adolescents who are not obese.

REFERENCES

- Arikunto, Suharsimi. (2010). "Research Procedures A Practical Approach." Jakarta: Rineka Cipta
- Asyera br Sinulingga Pika, et. al (2021). "The Relationship between Knowledge and Sedentary Behavior at Risk of Obesity in Adolescents in Medan City. " *Jurnal Health Sains* 2 (5). <https://doi.org/10.46799/jhs.v2i5.156> EE-ISSN:2723-6927
- Boulhanna, A., Anarghou, H., Ibour, S., Najimi, M. & Chigr, F. (2021) "Prevalence of Physical Activity, Sedentary Behaviour and Unhealthy Dietary Habits among Moroccan

Adolescents", *Turkish Journal of Computer and Mathematics Education*, vol. 12, no. 5, pp. 937-943. (access on August 04, 2022)

Centers for Disease Control and Prevention. (2016). "definition of obesity" . Available on : <https://www.cdc.gov/obesity/childhood/causes.html>.

District Health Office . Sidoarjo (2018). "Health Profile of Sidoarjo Regency in 2018"

Surabaya City Health Office (2018). "Health Profile of Surabaya city in 2016"

Ezzati M. (2017) <https://health.detik.com/berita-detikhealth/d...> (access on Juni 15 2022)

Fajanah, F.(2018)." Determinant factors of sedentary lifestyle in adolescents" Thesis. Muhammadiyah University of Semarang. Available on <http://repository.unimus.ac.id/2503/> [access on October 30 2020]

Flávia Miquetichuc Nogueira Nascente, Thiago Veiga Jardim* , Maria do Rosário Gondim Peixoto, Carolina de Souza Carneiro, Karla Lorena Mendonça, Thaís Inácio Rolim Póvoa, Ana Luiza Lima Sousa, Weimar Kunz Sebba Barroso and Paulo César Brandão Veiga Jardim.(2016). "Sedentary lifestyle and its associated factors among adolescents from public and private schools of a Brazilian state capital." *BMC Public Health* 16:1177 DOI 10.1186/s12889-016-3836- pp 1-8 (access on August 5 2022)

Hadi, H., Nurwanti, E., Gittelsohn, J., Andi, I.A., Astiti, D., West, K.P., Jr & Dibley, M.J. (2020), "Improved Understanding of Interactions between Risk Factors for Child Obesity May Lead to Better Designed Prevention Policies and Programs in Indonesia", *Nutrients*, vol. 12, no. 1, pp. 175. (access on Juni 22 2022)

Hastono. (2016). "Data Analysis in the Health Sector" Jakarta: Raja Grafindo Persada.

Hormenu, T. (2022), "Dietary intake and its associated factors among in-school adolescents in Ghana", *PLoS One*, vol. 17, no. 5. (access on August 5 2022)

<https://indonesiabaik.id/infografis/obesitas-ancam-remaja> (access on Juni 15 2022)

<https://www.unair.ac.id/2021/09/01/obesitas-remaja-dan-risiko-gangguan-jiwa> (access on Juni 23 2022)

<https://www.realsimple.com/health/fitness-exercise/sedentary-lifestyle-signs> (access on August 5 2022)

<https://rs-jih.co.id/readmore/bahaya-sedentary-lifestyle-dan-solusinya> (access on Juni 23 2022)

Ministry of Health Republic Indonesia , (2018). Health Research and Development Agency: "Basic Health Research Results Report (Riskesdas) 2018"

Ministry of Health Republic Indonesia ,(2016) . “Health Profile of East Java Province in 2016.” Jakarta

Kedir, S., Hassen, K., Melaku, Y. & Jemal, M. (2022), "Determinants of overweight and/or obesity among school adolescents in Butajira Town, Southern Ethiopia. A case-control study", *PLoS One*, vol. 17, no. 6. (access on August 5 2022)

Lestari, N. I. (2019). “The Relationship Between Carbohydrate Intake, Fat Intake And Physical Activity With The Incidence Of Obesity In Adolescents.” Thesis.Poltekkes Kemenkes Yogyakarta. Available on: <http://eprints.poltekkesjogja.ac.id/1335/> [access on September 15 2020]

Mandriyarini, Retno, et al. (2017). " Sedentary Lifestyle as a Risk of Obesity In Stunted High School Adolescents in Semarang City" *Journal of Nutrition College*, vol. 6, no. 2, pp. 149-155. (access on Juni 22 2022)

Miko, A., & Pratiwi, M. (2017). “The Relationship between Diet and Physical Activity with obesity incidence of health polytechnic students of the Ministry of Health of Aceh” *Action: Aceh Nutrition Journal*, 2(1), 1-5. doi:<http://dx.doi.org/10.30867/action.v2i1.29> . ((access on Juni 22 2022)

Mulyani NS, Arnisam, Fitri SH, Ardiansyah (2020). " Factors Causing Obesity in Young Women in Aceh Besar. *Journal of Nutrition Research*, Vol.8 No.1 2020 pp 44-47 (access on August 5 2022)

Nila, W.B., Ariana, A. & Wardhana, M. (2019), "Association between obesity and history of atopy with atopic dermatitis in children: A cross-sectional study", *Journal of General Procedural Dermatology & Venereology Indonesia*, vol. 4, no. 1, pp. 1-5. (access on August 5 2022)

Nursalam.(2017). “Practical Approach Nursing Science Research Methodology” Jakarta: Salemba Medika.

Nuryani, Muhdar, I.N., Ramadhani, F., Paramata, Y., Adi, D.I. & Bohari (2021) "Association of Physical Activity and Dietary Patterns with Adults Abdominal Obesity in Gorontalo Regency, Indonesia: A Cross-Sectional Study", *Current Research in Nutrition and Food Science*, vol. 9, no. 1, pp. 280-292. (access on August 6 2022)

Proverawati.(2010). “Obesity and Eating Behavior Disorders in Adolescents” Yogyakarta: Nuha Medika

Puspasari, Indah, et al. (2017) "Sedentary Lifestyle sebagai Faktor Risiko terhadap Kejadian Obesitas Anak Stunted Usia 9-12 Tahun di Kota Semarang." *Journal of Nutrition College*, vol. 6, no. 4, 2017, pp. 307-312. (access on August 6 2022)

Sara Araújo Silva, Ariene Silva, d.C. & Kênia Mara, B.C. (2021) "Lifestyle patterns associated with common mental disorders in Brazilian adolescents: Results of the Study of Cardiovascular Risks in Adolescents (ERICA)", *PLoS One*, vol. 16, no. 12. (access on Juni 21 2022)

Setiawati, F. S., Mahmudiono, T., Ramadhani, N., & Hidayati, K. F. (2019). "Intensity of Social Media Use, Exercise Habits, and Obesity in Adolescents at SMA Negeri 6 Surabaya in 2019" *Amerta Nutrition* [e-Journal] 3(3), pp 142.

Sugiyono (2016). "Quantitative, Qualitative and R&D Research Methods" Bandung: PT Alfabeta.

Sinulingga PA, Andayani LS, Lubis Z. (2021). "The Relationship of Knowledge with Sedentary Behavior at risk of obesity in adolescents in the city of Medan" *Jurnal Health Sains*: p-ISSN: 2723-4339 e-ISSN: 2548-1398 Vol. 2, No. 5, Mei 2021 pp 655-661 (access on August 5 2022)

Wulandari , S., Lestari, H., Fachlevy, A. F. (2017). "Factors Related to the Incidence of Obesity in Adolescents at SMA Negeri 4 Kendari in 2016" Thesis. Faculty of Public Health, Halu Oleo University. Available on: <http://ojs.uho.ac.id/index.php/JIMKESMAS/article/view/1239>. [access on September 29 2020]

Yuliana, Winarno ME (2020). "The Relationship of Physical Activity and Diet To Obesity Status In Junior High School Students" *Sport Science and Health* Vol 2 no 6 2020, pp 301-311 (access on Juni 22 2022)