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Eating Disorders and Sedentary Behavior with Obesity Risk in Adolescents

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ABSTRACT

Background: The incidence of obesity in adolescents continues to increase every year. Obesity is an overweight condition that exceeds normal limits due to the accumulation of fat in the body which can have an impact on physical health. This is a risk factor for causing death from non-communicable diseases. Adolescents who are obese in adolescence will continue into adulthood.
Purpose: This study aims to determine the relationship of eating disorder and sedentary behavior with the risk of obesity in adolescents at SMAN 99 Jakarta.
Methods: This study used a quantitative analytic survey method with a cross sectional design. The sample is 247 respondents with stratified random sampling technique. Data were collected using the Eating Attitudes Test (EAT-26) and Adolescent Sedentary Activity Questionnaire (ASAQ) questionnaires, as well as direct measurements of body weight and height.
Results: The results of this study found that the majority of respondents were at risk of obesity with 192 (91.9%) respondents not experiencing eating disorders, while those who experienced eating disorders were 36 (94.7%) respondents. In addition, the majority of obese respondents who behaved sedentary were 120 (96.8%) respondents, while those who did not behave sedentary were 108 (87.9%) respondents.
Conclusion: There is no association between eating disorder and the risk of obesity with a p-value of 0.541 (p>0.05), and there is an association between sedentary behavior and the risk of obesity with a p-value of 0.008 (p<0.05) in adolescents at SMAN 99 Jakarta.

Keywords: *Adolescents, Eating Disorder, Obesity, Sedentary Behavior.*

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BACKGROUND

Adolescent health is a special concern, because as the successors of the nation, they determine the success of a nation. The World Health Organization (WHO) (2019) explains that adolescence is a stage of development and growth of children towards adulthood which in the age range of 10-19 years. Adolescence will experience biological changes during puberty such as maturation of reproductive organs, increased height and weight, changes in bone composition and increased bone mass (Merita et al., 2020). Adolescents are a group at risk for nutritional problems because growth and development will occur during adolescence so that adolescents need to consume nutrients according to their needs (Gifari et al., 2020). One of the problems that is often experienced is obesity.

Obesity is the accumulation of excessive fat than can cause health problems. Obesity is a risk factor for death from non-communicable diseases. Some health problems that can be caused by obesity such as hypertension, high cholesterol, diabetes, cardiovascular disease, respiratory problems (asthma), musculoskeletal disease (arthritis), and some cancers (WHO, 2021). In addition, obesity can also have a negative impact on adolescent psychology such as self-esteem disorders. Adolescents who are obese will experience decreased self-confidence, be less active, feel depressed and do not participate in activities with peers (Sumiyati & Irianti, 2021). The global prevalence of excess of this condition has increased from 4% in 1975 to more 15% in 20016 (WHO, 2021). In 2013 and 2018 the incidence of overweight in adolescents aged 16-18 years in Indonesia increased from 7,3% to 13,5%, consisting of 9,5% overweight and 4% obese (Riskesdas Kementerian Kesehatan RI, 2018). The prevalence of overweight in adolescents age16-18 in DKI Jakarta Province also increased in 2013 and 2018, namely from 11,5% to 21,05% consisting of 12,76% overweight and 8,29% obese. Meanwhile for East Jakarta City, the nutritional status of adolescents aged 16-18 years was 13,53% overweight and 9,91% obese. This occurred in 9,19 % of female adolescents and 7,4% male adolescents aged 16-18 years in DKI Jakarta Province (Riskesdas DKI Jakarta, 2018).

The increase in the phenomenon of obesity in adolescents must be a special concern because adolescents who experience obesity in adolescents tend the continue into adulthood so that identification of factors that can be changed in overcoming obesity in needed (Nugroho et al., 2020). Obesity and eating disorders in adolescents can occur simultaneously. According to several studies, the global prevalence of eating disorders has increased, namely 3,5% in 2000-2006 to 7,8% in 2013-2018 (Galmiche et al., 2019). Eating disorders are a major problem experienced by adolescents which can have a negative impact on adolescents eating behavior (Merita et al., 2020).

Eating disorders are characterized by persistent disturbances in eating or eating behavior that result in altered food consumption or absorption than can significantly interfere with physical health and psychosocial functioning (Jebeile et al., 2021). The cause of eating disorders has not been specifically identified, but there are several possible causes of eating disorders such as emotional and cognitive conditions, genetics, social environmental factors, and the presence of stigma regarding weight (López-Gil et al., 2023).

In addition, obesity in adolescents often occurs in individuals who do light physical activities so that some of the energy expended is not used and most of it is stored as body fat (Mulyani et al., 2020). One of the risk factors for obesity is sedentary behavior. Sedentary behavior is a person's habit or activity other than sleep time that only produces

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energy of ≤ 1,5 metabolic equivalents (MET), for example just lying or sitting for a long time (watching TV, playing games), driving to school even though the distance is short, and changes in habits such as going to the store using a vehicle (Kementerian Kesehatan RI, 2019).

Based on the 2013 and 2018, Indonesian population aged ≥ 10 years with less physical activity increased, from 26,1% to 33,5%. Meanwhile, the population of DKI Jakarta Province with less physical activity also increased in 2013 and 2018, from44,2% to 47,8% (Riskesdas Kementrian Kesehatan RI, 2018). The proportion of the population in DKI Jakarta Province with sedentary behavior at the age 15-19 years ≥ 6 hours per day is 25,5%. Sedentary behavior is a significant concern in public health because the high level of this behavior can increase the risk of cardiovascular disease, obesity, and other adverse effect.

OBJECTIVE

This study was conducted to determine the relationship between eating disorder behavior and sedentary behavior with the risk of obesity in adolescents at SMAN 99 Jakarta.

METHODS

This study is a non-experimental study. The research design used in this study uses a quantitative analytical survey research type with cross sectional approach. The study was conducted at SMAN 99 Jakarta. The sample in this study were students in grades X and XI with a sampling technique using probability sampling with a stratified random sampling method of 247 respondents.

The instruments used in this study were the Eating Attitudes Test (EAT-26) questionnaire to measure eating disorders and the Adolescent Sedentary Activity Questionnaire (ASAQ) to measure sedentary behavior, and direct measurements of body weight and height were carried out using digital scales and stature meters. The EAT-26 questionnaire has three sub-variables that influence each other, namely diet, bulimia and food preoccupation, and oral control. The results of the validity and reliability test of this questionnaire are that all items are declared valid with a calculated r value of 0,362-0,785, and reliability value of 0,893 so that this questionnaire is declared reliable. The ASAQ questionnaire consist of 12 items grouped into five sub-variables, namely small screen recreation, education, travel, cultural activities and social activities. The validity test obtained a calculated r value of 0,57-0,86 and reliability value of 0.736.

This study has obtained ethical approval from the UPN Veteran Jakarta research ethics commission (Nomor : 172/V/2024/KEP).

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RESULTS

Respondent Characteristics

Table 1. Respondent Characteristics Based on Age

Variable	Mean	Median	Standard Deviation	Min-Max	N
Age	16,77	17	0,91	15-19	247

The data in table 1 shows that of the 247 adolescent respondents, the average age is 16,77 years with a median value of 17 years and a standard deviation of 0,91. Meanwhile, the minimum age of adolescents is 15 years and the maximum age is 19 years.

Tabel 2. Respondent Characteristics Based on Gender

Gender	Frequency (n)	Percentage (%)
Male	115	46,6
Female	132	53,4
Total	**247**	**100**

Based on the table above, it shows that the majority of respondents in this study were female, totaling 132 respondents (53,4%) and the rest were male, totaling 115 respondents (46,6%).

Univariate Analysis

Table 3. Respondents Characteristic Based on Eating Disorders, Sedentary Behavior, and Obesity Risk In Adolescents

Variable	Frequency (n)	Percentage (%)
Eating Disorders		
Not experience eating disorders	209	84,6
Experiencing eating disorders	38	15,4
Sedentary Behavior		
Not behaving sedentarily	123	49,8
Behaving sedentarily	124	50,2
Obesity Risk		
At risk of obesity	228	92,3

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Overweight	19	7,7
Total	**247**	**100**

The results above show that the majority of respondents do not experience eating disorders are 209 respondents (84,6%), while those who experience eating disorders are 38 respondents (15,4%). Respondents who did not behave sedentarily were 123 respondents (49,8%), while respondents who behaved sedentarily were 124 respondents (50,2%). The majority of respondents who were at risk of obesity were 230 respondents (92,4%), while those who were overweight were 19 respondents (7,6%).

Bivariate Analysis

Table 4. Analysis of The Relationship Between Eating Disorders and The Risk of Obesity in Adolescents

Eating disorders	Variable				Total		P-Value	OR (95% CI)
	Risk of obesity		Overweight		N	%		
	n	%	n	%				
Not experiencing an eating disorders	192	91,9	17	8,1	209	100	0,541	0,627 (0,139-2,834)
Experiencing an eating disorders	36	94,7	2	5,3	38	100		
Total	**228**	**92,3**	**19**	**7,7**	**247**	**100**		

The table above shows that the majority of respondents are at risk of obesity in adolescents who do not experience eating disorders as many as 192 respondents (91,9%) and those who experience eating disorders as many as 36 respondents (94,7%). Next, followed by respondents who are overweight, the majority do not experience eating disorders, namely 17 respondents (8,1%), while those who experience eating disorders are 2 respondents (5,3%).

Based on the results of the chi-square test, a p-value of 0,541 (p>0,05) was obtained. So there is no significant relationship between eating disorders and the risk of obesity in adolescents. The odd ratio results obtained an OR value of 0,627 (0,139-2,834) withOR <1, so adolescents who experience eating disorders are 0,627 times more at risk of obesity than those who do not experience eating disorders.

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Table 5. Analysis of The Relationship Between Sedentary Behavior and The Risk of Obesity in Adolescents

Sedentary Behavior	Variable				Total		P-Value	OR (95% CI)
	Risk of Obesity		Overweight		N	%		
	n	%	n	%				
Not behaving sedentary	108	87,9	15	12,1	123	100	0,008	0,240 (0,077-0,745)
Behaving sedentary	120	96,8	4	3,2	124	100		
Total	**228**	**92,3**	**19**	**7,7**	**247**	**100**		

The results above show that the majority of respondents are risk of obesity, both in those who do not behave sedentarily as many as 108 respondents (87,9%) and those who behave sedentarily as many as 120 respondents (96,8%). Next, followed by respondents who are overweight, the majority are not sedentary as many as 15 respondents (12,1%), while those who behave sedentary are 4 respondents (3,2%).

Based on the results of the chi-square test, a p-value of 0,008 (p<0,05) was obtained. So there is a significant relationship between sedentary behavior and risk of obesity in adolescents. The odd ratio results obtained an OR value of 0,240 (0,077-0,745) with OR <1, so adolescents who behave sedentary have q 0,24 times greater risk of obesity than those who do not behave sedentary.

DISCUSSION

Univariate Discussion

Respondent Characteristics Based on Age

The results of this study indicate that the age range of respondents is 15-19 years and is in the middle adolescence phase. According to (Hockenberry et al., 2016) adolescents at this stage are experiencing an identity crisis so that adolescents will seek self-identify and often make their own decisions and modify their body image. In adolescence, they will experience rapid growth and development. In addition, adolescents will also adapt to a lifestyle so that the younger the age of the adolescent, the more easily influenced in positive or negative ways (Suha & Rosyada, 2022). This happens because during adolescence, the process of growth and development will occur rapidly. Adolescents are also easily influenced by peers and try new things, for example in choosing types of fast food. Adolescents are also easily influenced by information on social media such as content or promotions from fast food restaurants, increasing the desire to buy them (Rahmasari et.al., 2024). Increasing age makes metabolism and muscle mass decrease so that there is a greater risk of weight gain (Yahya, 2017). Data from Riskesdas (2018)

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states that adolescents aged 16-18 with obesity are 14,5 %. This is also supported by research by Sugiatmi & Handayani (2018) that adolescents who experience obesity based on age are more in adolescents aged 16-17 years.

Respondent Characteristics Based on Gender

In this study, the gender of the respondents was dominated by woman. This is similar to research of Pradigdo et.al. (2023) and Putra (2017) that the majority of respondents were women. The study also showed a significant relationship between gender and the incidence of overweight. Women's body composition tends to be greater than men. The percentage of fat in women's bodies is higher (Pradigdo et.al., 2023). Women are more at risk of obesity because women's metabolism is slower than men's so women tend to convert more food into fat, while men will convert food into muscle and energy ready for use. Women also tend to have less muscle than men. Muscle will burn more fat than other cells. Therefore, in assessing nutritional status, gender must be considered because gender is one of the factors in obesity (Rosalinia et al., 2024).

Respondents Characteristic Based on Eating Disorders, Sedentary Behavior, and Obesity Risk In Adolescents

In this study, it was found that the majority of adolescents did not experience eating disorders. The same thing was also found in the study by Yani et.al. (2022), namely that 86,6% of adolescents did not experience eating disorders. The results of the study (Qalbya et al. 2022) also showed that the majority of adolescents (68,7%) in their study did not experience eating disorders. Eating disorders are a deviation in an individual's eating habits that are influenced by the individual's psychological condition (Noe et .al., 2019). In the adolescent phase, adolescent's emotions tend to be unstable. According to Fikawati et.al. (2017), psychological and cognitive conditions can cause psychosocial stress which can affect eating patterns in adolescents. Adolescents who experience eating disorders usually have feelings of worry about gaining weight. Adolescence makes adolescents more sensitive to their body shape because they already have a desire to be liked by their peers. Therefore, to get an ideal body shape, adolescents tend to choose to engage in unhealthy eating behaviors without paying attention to their nutritional intake. It can be cause of eating disorders (Tri Utami et al. 2023). One type of eating disorder can increase the risk of obesity in adolescents in binge-eating disorder (BED). BED is an eating disorder that involves consuming excessive amounts of food with an uncontrolled appetite that occurs at least once a week for three months. This is supported by research by Goutama & Chris (2021) which show that 40% of respondents who experience BED have overweight nutritional status.

The results of the study related to sedentary behavior show that the majority of adolescents behave sedentary. This is similar to the study by Qosim & Artanti (2023), . Qosim & Artanti (2023), namely that the majority of adolescents in this study engaged in sedentary behavior in the high category for >5 hours per day. Maidartati et.al's research (2022) also showed that 84% of adolescents in this study engaged in sedentary behavior in the high category. The results of the study by Lydia et.al. (2022) showed that 150 adolescents spent an average of 17 hours per week with the most frequent activity being

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watching videos. This is because technological advances allow teenagers to meet their needs without to do heavily physical activities, so that there will be a decrease in teenagers interest in doing outdoor physical activities and sports. Sedentary behavior can have an impact on several health problems including overweight, sleeps problems, depression, and psychological problems (Santrock, 2019). This is supported by research by Wardani et.al. (2022), showing a significant relationship between sedentary behavior and obesity with a negative correlation, meaning that the lower the physical (sedentary behavior), the higher the risk of a person experiencing obesity.

When adolescents engage in sedentary behavior for 5 hours/300 minutes per day, it can reduce the basal metabolic rate in the body which can result in fat accumulation and the risk of obesity (Lydia et.al., 2022). However, the results of this study are not in line with the recommendation of the Ministry of Health (2021) that individuals are not recommended to sit for more than two hours periodically. In addition, the Ministry of Health also recommended that someone do physical activity at least 3-5 times a week or the equivalent of 150 minutes per week. Meanwhile, in this study, the majority of adolescents engaged in sedentary behavior such as sitting in front of a computer or sitting around relaxing for more than 2 hours.

This study shows that the majority of respondents are at risk of obesity. Dewi's et al. (2023) research also shows the same thing, 57% of adolescents in this study were at risk of obesity. \ Alfionita et.al. (2023) also showed that the nutritional status of adolescents was dominated by normal IBM (51,4%), thin (11,4%), and obese (28,6%) where all three categories were at risk of obesity. According to Sugiatmi & Handayani (2018) the incidence of obesity in adolescents is associated with the health behaviors they currently implement. Adolescence is a period that is vulnerable to nutritional disorders due to changes in lifestyle as a form of searching for one's identity. Some risk factors for obesity that can occur in adolescents are lack of physical activity, consumption of junk food (fast food), not eating breakfast in the morning, lack of knowledge about nutritional needs, and genetic factors such as age, gender, and heredity from obese parents (Hanum 2023). Environmental factors can also affect the incidence of obesity in a person, especially adolescents who are experiencing a period of development because the behaviors that appear in their environment will be examples in choosing daily eating patterns (Herawati et al., 2019). Eating patterns can be seen from the frequency, excessive food portions, habits of consuming snacks, and foods or drinks that contain high sugar (Widyantari et.al., 2018when someone has an abnormal eating pattern such as eating large portions and eating at night. This can be a cause of obesity (Yahya, 2017).

Bivariate Discussion

Analysis of The Relationship Between Eating Disorders and The Risk of Obesity in Adolescents

The results of this study indicate that there is no relationship between eating disorders and the risk of obesity in adolescents. This is supported by research (Qalbya et.al., 2022) which shows that there is no relationship between eating disorders and nutritional status

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in adolescents. The incidence of eating disorders and the risk of obesity can be influenced by several factors, such as personal factors, behavioral factors, and social environmental factors (Fikawati et al., 2017).

In this study, adolescents did not feel worried about gaining weight so they did not restrict their diet or go on a diet to maintain their weight. This is line with research (Natarijadi & Hadiati, 2021) which also shows that there is a relationship between eating disorders and overweight preoccupation so that in this study adolescents did not feel worried about becoming fat.

Generally, individuals who experience eating disorders have feelings of anxiety and low self-confidence in dealing with their problems so that they will use food and diet as one of the solutions to their problems (Noe et.al., 2019). According to (Stabouli et.al., 2021), recognition of an eating disorder can prevent obesity or help with weight loss in cases of persistent obesity. This can happen because two types of eating disorders, namely anorexia nervosa and bulimia nervosa, tend to aim to lose weight by limiting food intake for anorexia nervosa, while in bulimia nervosa they tend to regurgitate food that has been eaten.

Analysis of The Relationship Between Sedentary Behavior and The Risk of Obesity in Adolescents

The results of this study indicate that there is a relationship between sedentary behavior and risk of obesity in adolescents. Adolescents in this study engaged in sedentary behavior for an average of 10 hours per day with the most common types of activities being using computer/smartphones/laptops to play video games, watch video, social media, and sit around chatting with their peers. Thes results indicate that on average, adolescents have easy access to gadgets. These results are supported by research showing that adolescents who use gadgets > 2 hours a day are 2,87 times more at risk of obesity (Wiardani & Kusumajaya, 2023). This ease access can be caused by the increasingly rapid development of technology and the majority of adolescents come from families with a fairly good economy as indicated by their parent's income of $\geq$ 5.000.000 rupiah per month.

Several factors that can encourage someone to behave sedentarily include technological developments, age, gender, and family socioeconomic status. Changes from childhood to adolescence increase sedentary behavior because as children get older, they will increasingly understand the use of electronic devices. Technological developments can also increase sedentary behavior and reduce physical activity because adolescents will do less manual work (Etika et al., 2024). This is in line with research conducted by (Islami et.al, 2023) which shows that there is a significant relationship between screen time and

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physical activity with the incidence of obesity in adolescents. In this study, the majority of adolescents had high levels of screen time, while in terms of physical activity, adolescents were at a low level. A similar thing was also found in research (Alfionita et.al, 2023) which showed that there was a relationship between sedentary behavior and the nutritional status of adolescents. In this study, the majority of adolescents were at risk of obesity with normal BMI categories (51,4%), thin (11,4%), and obese (28,6%). According to research (Nafi'ah & Nurlaella, 2022) it also shows that adolescents over the age of 13 are 1,5 times more at risk of behaving sedentarily for ≥ 6 per day.

Obesity in adolescents can occur due to lack of physical activity and excessive food intake so that energy will continue to accumulate in the body which risks causing obesity. Lack of physical activity in adolescents is also supported by advances in technology so that adolescents will choose to play smartphones while sitting for hours or other activities that require little energy or are called sedentary behavior (Islami et.al, 2023). This is supported by research (Ferinawati & Mayanti, 2018) showing that there is a relationship between light physical activity and the incidence of obesity in adolescents. Adolescents who do light physical activity are six times more at risk of obesity than adolescents who do heavy physical activity. Research conducted by (Aulia et.al., 2024) also shows that there is a significant relationship between sedentary behavior and nutritional status in adolescents and shows a directional correlation between sedentary behavior and nutritional status. The higher the sedentary behavior, the more it will cause excessive nutritional status such as overweight and obesity in adolescents.

Sedentary behavior is currently a serious concern because it is one of the factors for adolescents who are overweight and therefore at risk of obesity. Sedentary behavior makes a person not move much so that the metabolism in the body will be disrupted. This can cause the body to store a lot of fat and not be released as energy so that it will be at risk of obesity (Alfionita et.al., 2023).

However, different results were found in a study (Noerfitri et.al., 2021) which showed that there was no relationship between sedentary behavior and the incidence of overnutrition in adolescents. When someone behaves sedentary for a long time without being followed by high fat consumption, it cannot directly cause obesity in adolescents. Therefore, in addition to physical activity, fat intake also needs to be considered in diet.

CONCLUSION

The results of the study showed that there was a relationship between sedentary behavior and the risk of obesity in adolescents. This is certainly an important concern for adolescent health. Adolescents should avoid sedentary behavior, increase physical activity at least 3-5 times a week or equivalent to 150 minutes per week, and be able to maintain a regular diet and pay attention to fat intake in the diet.

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