Media Gizi Kesmas
p-ISSN 2301-7392, e-ISSN 2745-8598
10.20473/mgk.v14i1.2025.26-34

ORIGINAL ARTICLE **Open Access**

Factors Related to Obesity in Adolescent Girls in East Jakarta

Faktor yang Berhubungan dengan Obesitas Remaja Putri di Jakarta Timur

Sekar Woro Wilis[1], Ibnu Malkan Bakhrul Ilmi*[1], Yessi Crosita Octaria[1]

[1]Department of Nutrition, Faculty of Health Science, Pembangunan Nasional Veteran Jakarta University, Jakarta, 16515, Indonesia

Article Info

***Correspondence:**
Ibnu Malkan Bakhrul Ilmi
ibnuilmi@upnvj.ac.id

Submitted: 30-10-2024
Accepted: 04-06-2025
Published: 30-06-2025

Citation:
Wilis, S. W., Ilmi, I. M. B., & Octaria, Y. C. (2025). Factors Related to Obesity in Adolescent Girls in East Jakarta. *Media Gizi Kesmas*, 14(1), 26-34. https://doi.org/10.20473/mgk.v14i1.2025.26-34

ABSTRACT

Background: According to Basic Health Research (RISKESDAS) 2018, obesity prevalence in Jakarta is higher among women. In adolescent girls, obesity can persist into adulthood, causing reproductive issues. The factors contributing to obesity include energy and fat intake, body image perception, and physical activity.
Objectives: This study analyzes the relationship between energy intake, fat intake, physical activity, and body image with obesity.
Methods: This study is quantitative research with a cross-sectional design. The research was conducted at SMAN 98 Jakarta and SMAN 105 Jakarta, involving 108 female students aged 15-18 years from April to May 2024. Data were collected using stratified random sampling and analyzed using Spearman Rank for non-normally distributed variables and Pearson for normally distributed variables. Obesity variables were measured using BMI for age (BMI/A) and Bioelectrical Impedance Analysis; energy and fat intake were assessed using a 24-hour food recall instrument; body image was measured using the Multidimensional Body-Self Relations Questionnaire Appearance Scales.
Results: The correlation between energy and fat intake with obesity showed coefficients of r=0.035 (p=0.722) and r=0.074 (p=0.448) for body fat percentage, and r=-0.016 (p=0.869) and r=-0.034 (p=0.726) for BAZ. Physical activity correlated with obesity at r=0.197 (p=0.041) for body fat percentage and r=0.156 (p=0.107) for BAZ. Body image correlated with obesity at r=0.291 (p=0.002) for body fat percentage and r=0.309 (p=0.001) for BAZ.
Conclusion: The variables significantly associated with the occurrence of obesity are physical activity (when measured using body fat percentage) and body image. Meanwhile, the variables not associated with the occurrence of obesity are physical activity when measured by Body Mass Index for age (BMI for age), energy intake, and fat intake.

Keywords: Adolescent girls, Body image, Nutrient intake, Obesity, Physical activity

ABSTRAK

Latar Belakang: *Menurut Riset Kesehatan Dasar (RISKESDAS) tahun 2018, prevalensi obesitas di Jakarta lebih tinggi pada perempuan dibandingkan pria. Pada remaja putri, obesitas berlanjut hingga dewasa dan menyebabkan gangguan reproduksi.Faktor penyebab obesitas meliputi beberapa aspek, yaitu asupan energi dan lemak, persepsi citra tubuh, dan aktivitas fisik.*
Tujuan: *Tujuan penelitian ini adalah untuk menganalisis pengaruh asupan energi, asupan lemak, aktivitas fisik, serta citra tubuh dengan kejadian obesitas.*
Metode: *Penelitian ini merupakan penelitian kuantitatif dengan desain studi cross sectional. Penelitian dilakukan di SMAN 98 Jakarta dan SMAN 105 Jakarta mengambil 108 siswi 15-18 tahun pada April-Mei 2024. Data diambil menggunakan* Stratified Random Sampling *dan dianalisis menggunakan* Spearman Rank *pada variabel tidak normal dan Pearson pada variabel normal. Variabel obesitas diukur*

menggunakan IMT/U dan Biometrical Impendance Analysis*; asupan energi dan lemak menggunakan* food recall *24 jam; citra tubuh menggunakan* instrument Multidimentional Body Self Relation Questionnaire Appearance Scales.
Hasil: *Hasil uji korelasi antara asupan energi dan asupan lemak dengan obesitas pada persen lemak tubuh dengan nilai koefisien r=0.035 (p=0.722) dan r=0.074 (p=0.448), pada IMT/U dengan r=-0.016 (p=0.869) dan r=-0.034 (p=0.726). Hasil uji korelasi antara aktivitas fisik dengan kejadian obesitas menggunakan persen lemak tubuh dengan r=0.197 (p=0.041) dan menggunakan IMT/U dengan r=0.156 (p=0.107). Hasil uji korelasi citra tubuh dengan kejadian obesitas jika menggunakan persen lemak tubuh dengan r=0.291 (p=0.002) dan IMT/U dengan r=0.309 (p=0.001).*
Kesimpulan: *Variabel yang berhubungan secara signifikan dengan kejadian obesitas adalah aktivitas fisik (jika diukur menggunakan persentase lemak tubuh) dan citra tubuh. Sedangkan variabel yang tidak berhubungan dengan kejadian obesitas adalah aktivitas fisik jika diukur dengan Indeks Massa Tubuh per umur (IMT/U), asupan energi, dan asupan lemak.*

Kata kunci: *Aktivitas fisik, Asupan gizi, Citra tubuh, Obesitas, Remaja putri*

INTRODUCTION

Obesity prevalence is increasing in Indonesia, particularly among adolescent girls. The prevalence of obesity among adolescent girls between the ages of 16 and 19 was 4.0% in 2018, and this trend is predicted to continue. Meanwhile, DKI Jakarta ranks first nationwide, with 8.3% of adolescents being obese. In East Jakarta, the prevalence of adolescent obesity surpasses the rate in DKI Jakarta, reaching 9.91% (Badan Penelitian dan Pengembangan Kesehatan, 2020). Basic Health Research Data (RISKESDAS) shows that more women than men are obese. In 2013 in Indonesia, 1.6% of men and 1.7% of women were obese, increasing in 2018 to 3.6% of men and 4.5% of women. Meanwhile, in DKI Jakarta itself, the highest incidence of obesity is also in women, namely 9.19% and in men, 7.40%. Adolescent girls in East Jakarta experience a notable prevalence of overweight and obesity, reflecting broader urban trends in Indonesia. According to the 2018 Basic Health Research Survey (RISKESDAS), the combined prevalence of overweight and obesity among Indonesian adolescents aged 13-18 years was approximately 16%, with adolescent girls showing a higher rate (15.9%) compared to boys (11.3%) (Badan Penelitian dan Pengembangan Kesehatan, 2020).

Obesity in women carries the risk of infertility and negative effects on the fetus and offspring. In adolescent girls, obesity increases the risk of menstrual disorders in women of childbearing age. One of the main factors of infertility in women is obesity which is recognized as an independent factor. The incidence of infertility in overweight women is three times higher than in women with normal weight (Wei et al., 2022).

Overweight and obesity in adolescents tend to continue into adulthood. Therefore, overweight and obesity are considered serious problems (Nugroho, 2020). Obesity is associated with an increased risk of almost every chronic condition, including dyslipidemia, high blood pressure, type 2 diabetes mellitus, insulin resistance, and liver disease. Obesity significantly impacts the risk of stroke and cardiovascular diseases, certain cancers, and osteoarthritis (Brown, 2016; Hruby and Hu, 2015).

Factors causing obesity include energy and fat intake, perceived body image, and physical activity (Gifari, 2021; Telisa et al., 2020). Energy dense diets have been associated with a higher likelihood of obesity in young adults (Livingstone et al., 2022). Adolescents who consume excess energy have three times the risk of becoming obese compared to adolescents who consume sufficient energy (Telisa et al., 2020). Increased fat intake significantly increases the risk of obesity in men and women (Wang et al., 2020). If high-fat foods are consumed for a long period of time, combined with low physical activity, the risk of obesity can increase (Telisa et al., 2020). Research showed that fat intake was significantly correlated with the incidence of obesity in adolescents (Harlim et al., 2022; Mardiana et al., 2022). This research also states that teenagers with excessive fat intake are five times more likely to suffer from obesity (Mardiana et al., 2022).

Excessive food intake if not accompanied by sufficient physical activity for a long time can increase the risk of obesity. Children who are overweight tend to have low physical activity. High body mass makes people tend to be lazy about activities and prefer sleeping, sitting, eating and resting (Hong et al., 2016). Adolescents with very light physical activity are 9.5 times more likely to be obese than adolescents with light physical activity (Praditasari and Sumarmik, 2018). Apart from food intake and physical activity, perception of the body is also a factor in obesity.

Young women tend to pay more attention to self-assessment. A person's assessment of themselves can vary, for example, an individual who feels they are too fat even though in reality they are not or vice versa. These feelings greatly influence the consumption choices of young women, because they think that the food they consume greatly influences their body shape (Intantiyana et al., 2018). Adolescents tend to have misperceptions about their body weight, which aligns with the findings of a study conducted on Tunisian adolescents showing that half of the population has an incorrect perception of their body status (Ferhi et al., 2023). Several studies have reported that body image is correlated with the occurrence of obesity in female adolescents (Intantiyana et al., 2018; Larasati, 2019).

Based on RISKESDAS data showing the high prevalence of obesity in East Jakarta, there is a high prevalence of obesity in young women compared to young men, as well as research showing its relationship with energy intake, fat intake, physical activity and body image perception. Young women often face unique challenges and pressures related to body image, dietary habits, and physical activity levels that can differ from those experienced by boys. These may include societal beauty standards, parental control over food choices, and safety concerns impacting outdoor activity. Investigating these gender-specific vulnerabilities within the East Jakarta context is crucial for understanding the drivers of obesity in this demographic. In this regard, the aim of this research is to analyze the correlation between energy intake, fat intake, physical activity, and body image perception with the incidence of obesity in young women in East Jakarta.

METHODS

This study is an analytical observational study with a cross-sectional design aimed at identifying the relationship between energy intake, fat intake, physical activity, and body image with the incidence of obesity in adolescent girls in East Jakarta. The research was conducted at SMA Negeri 98 Jakarta and SMA Negeri 105 Jakarta from April to May 2024. The study population consisted of all female students from public high schools in East Jakarta for the 2023/2024 academic year.

Ethical approval for this study was obtained from the Ethics Committee of Universitas Prima Indonesia (KEPK), with reference number 072/KEPK/UNPRI/IV/2024. All participants were informed about the purpose of the study and consent was obtained from both the participants and their guardians prior to participation. The confidentiality of the participants' data was ensured throughout the study.

This study used the Slovin formula to determine the minimum total sample size with a margin of error of 10%, resulting in the largest sample size of 100 participants. The sample was selected using stratified random sampling, resulting in 63 students from SMA Negeri 98 Jakarta and 45 students from SMA Negeri 105 Jakarta. Respondents involved in this study have met the inclusion criteria, namely female students attending SMA Negeri 98 Jakarta and SMA Negeri 105 Jakarta; aged 15 to 18 years; willing to participate in the study until the end. Respondents were excluded if they met the exclusion criteria in the form of unhealthy conditions and malnutrition.

Obesity data were collected through two methods: body fat percentage using Biometrical Impedance Analysis Omron Karada Scan HBF-375 and BMI-for-age. Data on energy and fat intake were collected using a 2 x 24-hour recall form, physical activity data were obtained using the International Physical Activity Questionnaire Short-Form (IPAQ-SF), and body image data were collected using the Multidimensional Body Self Relation Questionnaire-Appearance Scales (MBSRQ-AS) which consists of 40 statements with scoring results modified from Khairani et al. (2019).This questionnaire is calculated using a Likert scale with cut-off intervals:

Table 1. Cut-Off Likert Scale

Score	Category
0%–20%	Very Low
21%–40%	Low
41%–60%	Adequate
61%–80%	High
81%–100%	Very High

In this study, the categories of independent variables include energy intake, fat intake, body image, and physical activity. The dependent variable category was obesity among female high school students in public schools in East Jakarta. The bivariate analysis in this study was further conducted using the Spearman rank test. This test was used to analyze the strength and direction of the relationship between the independent variables (energy intake, fat intake, body image, and physical activity) and the dependent variable (obesity) measured using body fat percentage and BMI-for-age among adolescent girls in East Jakarta.

Table 2. Cut-Off Category

Variable	Indicator		Source
Obesity	BAZ	Not Obese (≤+2SD) Obese (>+2SD)	"Permenkes No. 2 Tahun 2020,"
	Body Fat Percentage	Not Obese (<30%) Obese (≥30%)	William and Fawcett, (2002)
Energy Intake	Adequate (<130% RDA)		Kemenkes RI (2019)
Fat Intake	Excessive (>130% RDA)		
Body Image	Positive (score>mean) Negative (score≤mean)		Khairani et al., (2019)
Physical Activity	Light (<600 MET-minutes/week) Moderate (600–2999 MET-minutes/week) Heavy (≥3000 MET-minutes/week)		Goenawan and Tarawan, (2018)

RESULTS AND DISCUSSION

Characteristics of the Respondents

The characteristics of the respondents were then obtained with the following frequency distribution:

Table 3. The Characteristics of the Respondents

Variable	Frequency (n)	Percentage (%)
Age (years)		
15	11	10.2
16	48	44.4
17	43	39.8
18	6	5.6
Class		
10	56	51.9
11	52	48.1
Obesity		
Body Fat Percentage		
Obese	72	66.7
Not Obese	36	33.3
BMI-for-Age		
Obese	31	28.7
Not Obese	77	71.3
Energy Intake		
Adequate	104	96.3
Excessive	4	3.7
Fat Intake		
Adequate	16	14.8
Excessive	92	85.2
Physical Activity		
Light	23	21.3
Moderate	56	51.9
Heavy	29	26.9
Body Image		
Negative	58	53.7
Positive	50	46.3

Based on Table 3, most respondents were aged 16 years (44.4%) and 17 years (39.8%), with the majority in the 10th grade (51.9%) at both SMA Negeri 98 Jakarta and SMA Negeri 105 Jakarta. The prevalence of respondents aged 16 and 17 years is attributed to the selection of adolescents from 10th and 11th grades, whose age range primarily falls between 16 and 17 years. Of the 108 respondents studied, 72 respondents (66.7%) fell into the obesity category based on body fat percentage, while 36 respondents (33.3%) were categorized as non-obese. This indicates that more than half of the respondents had an excess body fat percentage. SMA Negeri 98 Jakarta had a higher obesity percentage at 37.0% compared to SMA Negeri 105 Jakarta, which had only 29.6%. In contrast, based on BMI-for-age (BAZ), 31 respondents were categorized as obese (28.7%) and 77 respondents were categorized as non-obese (71.3%). This suggests that more than half of the respondents did not fall into the obesity

category. The differing results from the two measurements are due to the fact that BMI-for-age is less sensitive compared to body fat percentage measurement. Therefore, BMI-for-age is not recommended as the sole indicator of nutritional status in adolescents with normal nutritional status. To strengthen the results of the BMI-for-age measurement, body fat percentage measurement is necessary (Widyastuti and Rosidi, 2018).

The physical activity scores of the respondents indicated that 51.9% had moderate physical activity, followed by 26.9% engaging in vigorous physical activity, and only 21.3% having light physical activity. The high percentage of respondents with moderate and vigorous physical activity may be attributed to the fact that the respondents are school students with a busy school schedule and the availability of physical activity programs in schools, such as group exercises and physical education classes. These factors contribute to a higher participation rate in structured physical activities, suggesting that the school environment plays a crucial role in promoting an active lifestyle.

According to the Multidimensional Body-Self Relations Questionnaire-Appearance Scales (MBSRQ-AS), which consists of 40 items using a Likert scale, a greater number of respondents reported having a negative body image (53.7%) compared to those with a positive body image (46.3%). This suggests that a majority of respondents struggle with negative perceptions of their body image. This finding highlights the need for interventions to improve self-acceptance and body satisfaction among the surveyed population. These negative perceptions can impact an individual's mental health and emotional well-being, potentially leading to lower self-esteem and increased anxiety.

Table 4. Description of Body Image Statement Scores

Aspect	Percentage	Category
Body Size Categorization	49.19	Adequate
Appearance Evaluation	54.44	Adequate
Appearance Orientation	61.97	High
Anxiety About Becoming Fat	71.13	High
Body Satisfaction	52.92	Adequate
Average Total	**57.93**	**Adequate**

In Table 4, it can be observed that Body Size Categorization scored 49.19%, categorized as "Adequate," indicating a moderate awareness of body size. Similarly, Appearance Evaluation achieved a score of 54.44%, also in the "Adequate" category, reflecting a balanced yet improvable perspective on physical appearance. Body Satisfaction scored 52.92%, maintaining the "Adequate" classification. In contrast, Appearance Orientation and Anxiety About Becoming Fat scored significantly higher, at 61.97% and 71.13%, respectively, both categorized as "High." These results suggest a stronger focus on appearance and heightened concerns about weight. The average total score of 57.93% is categorized as "Adequate," signifying an overall moderate level of satisfaction with body image but with particular areas of heightened focus and concern.

Bivariate Results

In this study, the bivariate analysis was further conducted using the Spearman rank test. This test was performed to analyze the strength and direction of the relationship between the independent variables, namely energy intake, fat intake, body image, and physical activity, and the dependent variable, which is obesity incidence. Obesity incidence was measured using body fat percentage and BMI-for-age among adolescent girls in East Jakarta. The Spearman rank test was chosen due to the ordinal nature of some variables and the potential for non-linear relationships. This approach allows for a comprehensive understanding of how these factors might contribute to obesity prevalence in the target population. Consequently, the findings from this analysis will provide valuable insights into potential risk factors for adolescent obesity.

Table 5. Bivariate Results

Variable		Obesity Incidence	
		BMI for Age	**Body Fat Percentage**
Energy Intake	r	-0.016	0.035
	p value	0.869	0.722
Fat Intake	r	-0.034	0.726
	p value	0.074	0.448
Physical Activity	r	0.156	0.197
	p value	0.107	0.041*
Body Image	r	0.309	0.291
	p value	0.001*	0.002*

Media Gizi Kesmas
p-ISSN 2301-7392, e-ISSN 2745-8598
10.20473/mgk.v14i1.2025.26-34

Table 5 presents the bivariate results indicating a relationship between physical activity and obesity when measured using body fat percentage, with a p-value of 0.041 and a correlation coefficient (r-value) of 0.107, suggesting a weak positive relationship. Regarding body image, there is a highly significant relationship between body image and the incidence of obesity in this study, as observed in both measurements using body fat percentage (p-value 0.002) and BMI-for-age (IMT/U) (p-value 0.001). The correlation coefficients (r-values) of 0.291 and 0.309 indicate a weak positive correlation in both measurements, where a more positive body image is associated with an increased likelihood of adolescent girls experiencing obesity.

Relationship between Energy Intake and Obesity

Based on the correlation test results, there is no relationship between energy intake and the incidence of obesity as measured by BMI-for-age (BAZ) or body fat percentage in this study. This finding aligns with research by Permatasari and Pertiwi (2022), which found no significant relationship between energy intake and obesity in 36 adolescent girls with an average age of 19.67 years in Yogyakarta. However, these results differ from the study conducted by Gifari (2021), which showed a positive relationship between energy intake and the incidence of overnutrition in adolescents in Jakarta, indicating that obese adolescents had a higher average energy intake compared to non-obese adolescents. Similarly, research by Telisa et al. (2020) found a significant relationship between energy intake and obesity among 118 adolescents in SMA Xaverius 3 and SMA Xaverius 2 Palembang.

These differences may be attributed to other factors not investigated, such as the composition of energy consumed by the respondents. If adolescents primarily consume energy from nutrients that can reduce body fat composition, such as fiber, the risk of obesity may decrease (Zaki et al., 2022). The lack of association between energy intake and obesity might also be due to the majority of respondents not having a high-energy diet. High-energy diets have been associated with a higher likelihood of obesity among young adults (Livingstone et al., 2022). According to recall data, many respondents consumed meals prepared by their mothers, with only a few actively purchasing junk food. Furthermore, obesity can occur due to long-term imbalances, leading to excess fat storage (Ermona and Wirjatmadi, 2018) . Excess energy intake, if accompanied by sufficient physical activity, may reduce the risk of obesity.

Relationship between Fat Intake and Obesity

The correlation test results indicate that fat intake does not correlate with the incidence of obesity in this study, whether using body fat percentage measurements or BMI-for-age. This finding is consistent with research by Mawaddah and Muniroh (2019), which found no significant relationship (p-value 0.814) between fat intake and nutritional status in 490 adolescent girls at SMA Negeri 3 Surabaya. Similarly, Praditasari and Sumarmik (2018) reported no correlation between fat intake and overweight (p-value 0.240) among adolescent girls at SMP Bina Insani Surabaya using a case-control design. Conversely, a study by Mokolensang et al. (2016) found a significant relationship (p-value 0.000) between fat intake and obesity in adolescents aged 13-17 in Bitung City, while Gifari et al. (2020) reported a positive correlation between fat intake and body fat percentage among adolescents in DKI Jakarta.

The discrepancies may arise from the methods used to assess nutritional status; the previous studies utilized waist circumference and BMI-for-age measurements, while this study employed body fat percentage. BMI-for-age measurements tend to be less sensitive than body fat percentage measurements for assessing nutritional status in adolescents (Widyastuti and Rosidi, 2018). Gender differences may also affect fat accumulation patterns, with females more likely to convert food into fat (Hassan et al., 2016). This is partly because women's metabolism is slower than men's, with males having a basal energy requirement that is 10% higher than that of females.

Fat accumulation in the body results from excessive fat consumption. If this excess fat intake is not balanced by increased fat oxidation processes, obesity can occur if this condition persists (Rusyani, 2019). High-fat diets can alter adipose tissue, mitochondrial function, and insulin sensitivity, impacting body composition. These changes may be influenced by different types of fatty acids in the diet, making it essential to understand the types of fats consumed (Praditasari and Sumarmik, 2018).

Relationship between Physical Activity and Obesity

However, no relationship was observed between physical activity and obesity incidence when using BMI-for-age measurements (p-value 0.107). This aligns with findings from Gifari et al. (2020), which reported no relationship between physical activity and adolescent obesity in DKI Jakarta (p-value 0.912). Similarly, a study by Putri et al., (2022) found no relationship between physical activity (p-value 0.398) and central obesity in adolescents aged 15-18 in DKI Jakarta. These consistent findings across multiple studies suggest that BMI-for-age might not be the most sensitive indicator for detecting the impact of physical activity on obesity in this demographic. It's possible that other confounding factors or the specific type of physical activity engaged in could be influencing these results. Further research using more detailed

physical activity assessments and body composition analyses might be needed to fully understand this relationship.Active physical activity plays a crucial role in health, body fat regulation, calorie expenditure, and weight loss (Aziz et al., 2023). Herliana et al. (2019) noted that during physical activity, the body utilizes stored energy, aiding weight loss, preventing sedentary-related diseases, and mitigating obesity.

Relationship between Body Image and Obesity

Correlation testing revealed a highly significant relationship between body image and the incidence of obesity in this study, evident in both body fat percentage measurements (p-value 0.002) and BMI-for-age (p-value 0.001). The correlation coefficients (r values) of 0.291 and 0.309 indicate a weak positive relationship in both measurements, where a more positive body image correlates with a higher likelihood of adolescent girls experiencing obesity. This aligns with findings from Intantiyana et al. (2018), which identified a relationship between positive body image (p-value 0.008) and obesity incidence in adolescent girls. Additionally, a study conducted at SMAN 106 Jakarta Timur with 40 respondents found a relationship between body image and adolescent obesity (Rotua, 2015).

This indicates that body image is a significant factor influencing obesity among adolescent girls in East Jakarta. A positive body image can affect food choices among adolescent girls; those with a positive body image tend to feel satisfied, comfortable, and confident in themselves, leading to less concern about dietary restrictions for maintaining ideal weight (Intantiyana et al., 2018). This suggests that promoting a healthy body image could be a crucial intervention strategy for obesity prevention in this demographic. Furthermore, focusing solely on dietary restrictions without addressing body image concerns might be less effective. Therefore, a holistic approach that integrates body image interventions with nutritional education is likely to yield better outcomes.

Poor body image is often linked to mental health issues, which can trigger low motivation, negative self-talk, and reduced self-care, adversely affecting overall health and increasing obesity risk (Weinberger et al., 2016). Individuals with poor body image frequently hold distorted perceptions of their body size, which can lead to overestimation of body weight and size, resulting in unhealthy attitudes toward weight loss and contributing to obesity (Gruszka et al., 2022). This theory aligns with the findings of this study, where most respondents experienced obesity and reported poor body image, often perceiving themselves as too thin or too overweight. The respondents exhibited high levels of anxiety about becoming overweight.

This study effectively investigates factors related to obesity in adolescent girls in East Jakarta through a cross-sectional design, utilizing a representative sample of 108 participants selected via stratified random sampling. A key strength lies in its dual measurement of obesity using both BMI-for-age and the more sensitive body fat percentage via Bioelectrical Impedance Analysis, addressing the limitations of BMI-for-age as a sole indicator. The use of validated instruments for assessing energy intake, fat intake, physical activity, and body image further enhances data reliability. The bivariate analysis employing the Spearman rank test is appropriate for analyzing relationships between variables. However, the cross-sectional nature of the study prevents establishing causality. Additionally, the 24-hour food recall method for dietary assessment is prone to recall bias, potentially influencing the observed lack of correlation between energy and fat intake and obesity. The acknowledged other factors not investigated that could explain differing results from other studies indicate a potential limitation in comprehensive variable consideration. Lastly, while focused on adolescent girls, the generalizability of findings may be limited to similar urban demographics, potentially.

CONCLUSION

Based on this study, it can be concluded that there is a significant relationship between physical activity and the incidence of obesity, as well as a highly significant relationship between body image and the incidence of obesity. However, no relationship was found between energy intake and fat intake with the incidence of obesity among female students at SMA Negeri 98 and SMA Negeri 105 Jakarta.

Acknowledgment

Thank you to SMAN 98 Jakarta and SMAN 105 Jakarta, as well as the respondents who granted permission and provided assistance during the research.

Conflict of Interest and Funding Disclosure

The authors report no conflicts of interest in this study.

Author Contributions

SWW: conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, project administration, resources, software, roles/writing-original draft, writing-review & editing; IMBI: conceptualization, methodology, validation, supervision, writing-review, and editing; YCO: conceptualization, methodology, validation, supervision, writing-review, and editing.

REFERENCES

Aziz, S.A., Pramana, Y., Sukarni, S., 2023. Hubungan Aktivitas Fisik dengan Kejadian Obesitas pada Remaja. MAHESA : Mal Health Stu J 3, 1115–1124. https://doi.org/10.33024/mahesa.v3i4.10238.

Badan Penelitian dan Pengembangan Kesehatan, -, 2020. Laporan Nasional Riskesdas 2018. Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan, Jakarta.

Brown, J.E., 2016. Nutrition Through the Life Cycle. Cengage Learning.

Ermona, N.D.N., Wirjatmadi, B., 2018. Hubungan Aktivitas Fisik Dan Asupan Gizi Dengan Status Gizi Lebih Pada Anak Usia Sekolah Dasar Di Sdn Ketabang 1 Kota Surabaya Tahun 2017. AMNT 2, 97. https://doi.org/10.20473/amnt.v2i1.2018.97-105.

Ferhi, M., Dalhoumi, A., Ghammam, R., Mannai, J., 2023. Body Image Misperceptions Among Tunisian Adolescents. Cureus 15(11), e48981. https://doi.org/10.7759/cureus.48981

Gifari, N., 2021. Analisis Faktor Determinan Kejadian Obesitas Remaja di DKI Jakarta. Nasya Expanding Management.

Goenawan, H., Tarawan, V.M., 2018. Gambaran Pengetahuan Tentang Pentingnya Aktivitas Fisik Sebagai Pencegah Sindrom Metabolik Pada Staf Perguruan Tinggi Di Jawa Barat. Jurnal Pengabdian Kepada Masyarakat 2, 330–333.

Gruszka, W., Owczarek, A.J., Glinianowicz, M., Bąk-Sosnowska, M., Chudek, J., Olszanecka-Glinianowicz, M., 2022. Perception of body size and body dissatisfaction in adults. Sci Rep 12, 1159. https://doi.org/10.1038/s41598-021-04706-6.

Harlim, A., Bontong, S.I., Rahfiludin, M.Z., 2022. Relationship between Carbohydrate, Protein, and Fat Consumption with Obesity Incidence in 2014 UKI Faculty of Medicine Students = Hubungan Asupan Karbohidrat, Protein, dan Lemak dengan Kejadian Obesitas pada Mahasiswa Fakultas Kedokteran UKI 2014. Amerta Nutrition 6, 385–391. https://doi.org/10/5/KorespondenRelationshipbetweenCarbohydrate.pdf

Hassan, N.E., Wahba, S., El-Alameey, I.R., El-Masry, S.A., AbuShady, M.M., Hameed, E.R.A., Ibrahim, T.S., Boseila, S., 2016. Dietary Behaviour Pattern and Physical Activity in Overweight and Obese Egyptian Mothers: Relationships with Their Children's Body Mass Index. Open Access Maced J Med Sci 4, 353–358. https://doi.org/10.3889/oamjms.2016.095.

Herliana, M.N., Indrawan, B., Rubiana, I., 2019. Sosialisasi Bahaya Hipokinetik Terhadap Pertumbuhan Dan Perkembangan Anak Pada Guru Pjok Sd Dan Smp Se-Kecamatan Cibereum Kota Tasikmalaya. Abdimas Siliwangi 2, 82–89. https://doi.org/10.22460/as.v2i2p82-89.3060.

Hong, I., Coker-Bolt, P., Anderson, K.R., Lee, D., Velozo, C.A., 2016. Relationship Between Physical Activity and Overweight and Obesity in Children: Findings From the 2012 National Health and Nutrition Examination Survey National Youth Fitness Survey. Am J Occup Ther70, 7005180060p1-7005180060p8. https://doi.org/10.5014/ajot.2016.021212.

Hruby, A., Hu, F.B., 2015. The Epidemiology of Obesity: A Big Picture. Pharmaco Economics 33, 673–689. https://doi.org/10.1007/s40273-014-0243-x.

Intantiyana, M., Widajanti, L., Rahfiludin, M.Z., 2018. Hubungan Citra Tubuh, Aktivitas Fisik Dan Pengetahuan Gizi Seimbang Dengan Kejadian Obesitas Pada Remaja Putri Gizi Lebih Di Sma Negeri 9 Kota Semarang. Jurnal Kesehatan Masyarakat 6, 404–412. https://doi.org/10.14710/jkm.v6i5.22064.

Kementrian Kesehatan, n.d. Permenkes No. 28 Tahun 2019 [WWW Document]. Database Peraturan | JDIH BPK. URL http://peraturan.bpk.go.id/Details/138621/permenkes-no-28- (accessed 6.7.25).

Khairani, A.P., Hannan, H., Amalia, L., 2019. Pengembangan Alat Ukur Skala Citra Tubuh. Proyeksi 14, 195–205. https://doi.org/10.30659/jp.14.2.195-205.

Larasati, L.V., 2019. Hubungan Obesitas Dengan Gangguan Citra Tubuh Pada Remaja Putri Di Pondok Pesantren Al Munawwir Krapyak Yogyakarta Hubungan Obesitas Dengan Gangguan Citra Tubuh Pada Remaja Putri Di Pondok Pesantren Al Munawwir Krapyak Yogyakarta (s1_sarjana). Universitas 'Aisyiyah Yogyakarta.

Livingstone, K.M., Sexton-Dhamu, M.J., Pendergast, F.J., Worsley, A., Brayner, B., McNaughton, S.A., 2022. Energy-dense dietary patterns high in free sugars and saturated fat and associations with obesity in young adults. Eur J Nutr 61, 1595–1607. https://doi.org/10.1007/s00394-021-02758-y.

Mardiana, M., Yusuf, M., Sriwiyanti, S., 2022. Hubungan Beberapa Faktor Dengan

Kejadian Obesitas Remaja Di Palembang. JPP (Jurnal Kesehatan Poltekkes Palembang) 17, 63–70. https://doi.org/10.36086/jpp.v17i1.1169.

Mawaddah, N., Muniroh, L., 2019. Hubungan Body Image Dan Tingkat Kecukupan Zat Gizi Makro Dengan Status Gizi Pada Remaja Putri SMA Negeri 3 Suarabaya. Jurnal Keperawatan Muhammadiyah. https://doi.org/10.30651/jkm.v4i2.2017.

Mokolensang, O.G., Manampiring, A.E., Fatimawali, 2016. Hubungan Pola Makan Dan Obesitas Pada Remaja Di Kota Bitung. eBiomedik 4. https://doi.org/10.35790/ebm.v4i1.10848.

Nugroho, P.S., 2020. Jenis Kelamin Dan Umur Berisiko Terhadap Obesitas Pada Remaja Di Indonesia. An-Nadaa: Jurnal Kesehatan Masyarakat 7, 110. https://doi.org/10.31602/ann.v7i2.3581.

Permatasari, P.D., Pertiwi, K.R., 2022. Asupan Makronutrien Dan Hubungannya Dengan Obesitas Remaja Putri Di Yogyakarta Dan Sekitarnya. Kingdom: J Biol Stud 8, 18–33. https://doi.org/10.21831/kingdom.v8i1.18198.

Permenkes No. 2 Tahun 2020 [WWW Document], n.d. . Database Peraturan | JDIH BPK. URL http://peraturan.bpk.go.id/Details/152505/permenkes-no-2-tahun-2020 (accessed 6.7.25).

Praditasari, J.A., Sumarmik, S., 2018. Asupan Lemak, Aktivitas Fisik Dan Kegemukan Pada Remaja Putri Di Smp Bina Insani Surabaya. MGI 13, 117. https://doi.org/10.20473/mgi.v13i2.117-122.

Putri, R.N., Nugraheni, S.A., Pradigdo, S.F., 2022. Faktor-Faktor yang Berhubungan dengan Kejadian Obesitas Sentral pada Remaja Usia 15-18 Tahun di Provinsi DKI Jakarta (Analisis Riskesdas 2018). MEDIA KESEHATAN MASYARAKAT INDONESIA 21, 169–177. https://doi.org/10.14710/mkmi.21.3.169-177.

Rusyani, N.L.M., 2019. Hubungan Tingkat Konsumsi Lemak Dan Aktivitas Fisik Dengan Obesitas Pada Remaja Di Smp Santo Yoseph Denpasar (diploma). Poltekkes Denpasar.

Telisa, I., Hartati, Y., Haripamilu, A.D., 2020. Faktor Risiko Terjadinya Obesitas Pada Remaja SMA. Faletehan Health J 7, 124–131. https://doi.org/10.33746/fhj.v7i03.160.

Wang, L., Wang, H., Zhang, B., Popkin, B.M., Du, S., 2020. Elevated Fat Intake Increases Body Weight and the Risk of Overweight and Obesity among Chinese Adults: 1991–2015 Trends. Nutrients 12, 3272. https://doi.org/10.3390/nu12113272.

Wei, W., Zhang, X., Zhou, B., Ge, B., Tian, J., Chen, J., 2022. Effects of female obesity on conception, pregnancy and the health of offspring. Front Endocrinol 13. https://doi.org/10.3389/fendo.2022.949228.

Weinberger, N.-A., Kersting, A., Riedel-Heller, S.G., Luck-Sikorski, C., 2016. Body Dissatisfaction in Individuals with Obesity Compared to Normal-Weight Individuals: A Systematic Review and Meta-Analysis. Obesity Facts 9, 424–441. https://doi.org/10.1159/000454837.

Widyastuti, R.A., Rosidi, A., 2018. Indeks Massa Tubuh Menurut Umur sebagai Indikator Persen Lemak Tubuh pada Remaja.

Zaki, I., Wati, T.W., Kurniawati, T.F., Putri, W.P., Khansa, I., 2022. Diet Tinggi Serat Menurunkan Berat Badan pada Obesitas. J. NC 2, 1. https://doi.org/10.24114/jnc.v2i2.36756.