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Lifestyle Habits Associated to Overweight Among Female Adolescents in Tasikmalaya, West Java, Indonesia

Gaya Hidup yang Berhubungan dengan Kejadian Kegemukan pada Remaja Putri di Kota Tasikmalaya, Jawa Barat, Indonesia

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ABSTRACT

Background: Adolescence, specifically among female is a high-risk period for weight gain and the incidence of being overweight. Lifestyle is considered a significant contributing factor to overweight in female adolescents.
Objectives: This study aimed to examine the association between lifestyle, particularly daily activity and eating habits with the incidence of being overweight among female adolescents in Tasikmalaya City, West Java.
Methods: A cross-sectional design was used with 275 subjects from seven state junior high schools selected by proportional random sampling. The data collected included demographics, lifestyle comprising daily activity, eating habits, as well as the incidence of being overweight, measured using the Body Mass Index-Age-Z score (BAZ). The association between lifestyle and overweight was evaluated using binary logistic regression.
Results: The results showed that out of 275 subjects, 51 were overweight (18.5%) and 224 (81.5%) had normal weight. The risk factors for being overweight included sleeping less than seven hours a day (p=0.017; OR=3.020; 95%CI=1.218-7.486), mild physical activity (p=0.008; OR=19.251; 95%CI=2.170-170.790), breakfast frequency less than 3 times a week (p=0.033; OR=2.418; 95% CI=1.074-5.443) and frequent snacking habits (p=0.000; OR=15.022; 95% CI=5.922-43.846).
Conclusions: Several lifestyles were found to significantly impact the incidence of being overweight among female adolescents, thus suggesting the need to make lifestyle modifications.

INTRODUCTION

In 2023, the population of adolescents aged 10–19 years is expected to reach 1.2 billion or 16% of the total world population[1]. Adolescence is a critical period of rapid growth with high nutritional needs, thereby increasing vulnerability to malnutrition[2]. The nutritional status of female adolescents in Low-Middle Incomes Countries (LMICs) requires urgent attention, given that an estimated 21 million pregnancies occur annually among those aged 15-19 years in this region[3]. Nutritional problems faced by young female not only impact their current lives but also have far-reaching consequences capable of even affecting the next generation[4].

Malnutrition remains a major nutritional problem among female adolescents throughout the world, but the types of nutritional problems occurring in this group continue to change significantly. The proportion of stunting and underweight has decreased significantly, while the level of overweight has increased[5]. Currently, the increasing problem of being overweight not only occurs in high-income countries (HICs) but also LMICs[6]. Overweight in adolescence is a strong predictor of higher mortality rates in adulthood[7]. Additionally, it contributes to an increased risk of chronic diseases, including cancer, diabetes, metabolic syndrome, and cardiovascular disease[8]. Adolescents or adults who are overweight during pregnancy may experience an increased risk of cesarean delivery, labor induction, preeclampsia, and gestational Diabetes Mellitus[9].

Apart from genetics and demographics, lifestyle also contributes to the incidence of being overweight[10]. Adolescence, the period between the ages of 10 and 19 years,[11] is a critical period for individuals to develop lasting healthy behavior. Lifestyle during this period will continue into adulthood and play an important role in increasing the risk of health problems later in life[12]. Daily physical activity, including physical exercise, sedentary behavior, and sleep duration, as well as eating habits can contribute to overweight in adolescents[13].

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Unhealthy lifestyle leading to overweight include sedentary behavior such as insufficient physical activity, activity that require long screen time, lack of sleep, and eating habits with excessive energy intake[14]. Furthermore, low physical activity among adolescents is reflected in prolonged screen time, short sleep duration, and low physical activity[15]. Eating habits such as reduced breakfast intake, a lack of vegetables and fruit consumption, and frequent intake of soft drinks also increase the risk of being overweight[16].

Indonesia, one of the LMICs[3], also experienced an increase in the prevalence of being overweight from 10.8%[17] in 2013 to 15.2% in 2018[18]. Tasikmalaya, located in West Java province, predominantly comprises the Sundanese population known for their plant-based diet[19]. A previous study by Hidayanti et al, (2023) reported that the incidence of overweight among young female living in Islamic boarding schools in Tasikmalaya City was 18.3%[20]. Therefore, this study aimed to measure overall lifestyle including eating habits and daily activity comprising length of screen time, sleep duration, and physical activity with the incidence of overweight among female adolescents in Tasikmalaya City, Indonesia.

METHODS

This was an observational study conducted using a cross-sectional design and the subjects were adolescents female students at state junior high schools in Tasikmalaya City. The samples were randomly selected from 7 out of 21 (30%) state junior high schools. All principals from the seven schools granted the approval for conducting this study. The sample size was determined through minimal sample calculation[21] resulting in 287 subjects with the addition of 20% to account for potential non-responses. However, the determination of subjects was carried out using proportional random sampling (Table 1). This study received ethical approval from the Mataram Health Polytechnic with number LB.01.03/6/295/2003 on July 7, 2023.

Table 1. Number of population and study subjects

Name of school	Population	Subject
SMPN A	384	47
SMPN B	370	46
SMPN C	350	43
SMPN D	347	43
SMPN E	314	39
SMPN F	295	36
SMPN G	265	33
Total	2332	287

Selected subjects and their parents or legal guardians were given an explanation regarding the purpose and implementation of the study. After agreeing to participate, the participants were asked to sign informed consent. In this study, 12 subjects had a BMI/U Z score <-2 SD (thin) and were excluded from data analysis, leaving only 275.

The dependent variable was overweight measured through BAZ, while body weight was assessed using digital scales (seca 803) with an accuracy of 0.1 kg. At the time of weighing, all subjects wore school uniforms and did not wear shoes. Height was measured three times using a stadiometer (Kenko) with an accuracy of 0.1 cm. The average value of three height measurements was used in data analysis. When measuring height, all subjects did not wear shoes, but wore a hijab, and calculation of BMI/U Z Score was carried out using WHO antro +. The results were then differentiated into overweight when the BAZ score was >+1, and normal for values ranging from ≤+1 to <2 SD[22].

The independent variable was lifestyle which included daily activity and eating habits. Daily activity comprised screen time, nap habits, nap time, and physical activity. Screen time data was obtained through interviews using a questionnaire regarding how long (hours) the subject spent a day watching television (TV), using a cellphone (HP), playing Play Station, or using a tablet[23]. Data were then differentiated between >3 hours per day and ≤3 hours per day[24]. Subjects were also asked about the duration of sleeping at night. Length of sleep at night was obtained by asking what time the subject started sleeping at night and woke up in the morning. The total duration of sleep in one day (hours) was obtained by adding the duration of sleep (hours) during the day and night. Data on sleep duration were grouped into <7 hours per day and ≥7 hours per day. Furthermore, physical activity variables were measured using the Physical Activity Questionnaire for Adolescents (PAQ-A), and categorized into ≤2.3 light physical activity and >2.3 heavy physical[26,27].

Independent variables for eating habits include breakfast frequency, main meal frequency, snack habits, and sugar-sweetened beverage (SSB) consumption. Data on breakfast habits, frequency of breakfast in a week and main meals were obtained through interviews using a questionnaire. Habits of eating breakfast is a practice usually carried out by subjects in consuming food in the morning from 05.00 to 10.00 WIB. The answer was categorized as "yes" when the subject often eats breakfast and "no" when the subject does not consume breakfast. Subsequently, subjects were asked the frequency of taking breakfast in one week, and data were divided into ≤3 times per week and >3 times per week. Data on the main food frequency variable were obtained by asking how many times the subjects consumed the main food in one day, and the answers were divided into <3 times a day and ≥3 times a day. Snack, SSB, vegetable, and fruit consumption habits were measured using FFQ[28]. Answers were divided into frequent when the FFQ score was ≥average and rarely when <average.

In this study, demographic measurements were also taken including age, family status, number of family

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members, family type, mother education, father education, mother employment status, father employment status, family income, and daily pocket money. Demographic data was obtained through interviews using a questionnaire. Age was defined as the length of time lived from the time the subject was born until when the study was carried out, divided into 13-14 years and 15-16 years. Family status referred to the condition of the family in which the subject lives, divided into single when the subject lives with only one parent, and complete when living with both parents. The number of family members was divided into >4 people and ≤4 people. The family type was measured by asking who in the family lives with the subject, divided into extended when the subject lives with a family other than the nuclear, for example, grandparents, etc., and nuclear family when the subject only lives with the father, mother, brother, or sister. Father and mother last education were categorized into elementary and junior high school, as well as high school and university. Parental employment status was measured by asking the subject whether the parents had a job, divided into working and not working. Furthermore, family income was defined as the amount of money earned in one month, divided into > minimal wage and < minimal wage. Subjects were also asked how much pocket money their parents offer every day, divided into <IDR 20000 and ≥IDR 20000. All data collection on nutritional status, daily activity, eating habits, and demographics was carried out with the assistance of eight nutrition students (semester 8) who were recruited from local universities in Tasikmalaya. All enumerators have received training on anthropometric measurements and perception equations regarding questionnaires before conducting the study.

Data analysis in this study was conducted using IBM SPSS for Windows version 26 software, including univariate, bivariate, and multivariate analyses. Univariate analysis described each variable using a frequency distribution table, while bivariate analysis used binary logistic regression, and variables with p<0.25 were included in multiple logistic regression modeling. In addition, OR (cOR and aOR) was also calculated with a 95% confidence interval (CI), and significance was set at p-value <0.05.

RESULTS AND DISCUSSION

Among the 275 subjects, 51 (18.5%) were overweight, while 224 (81.5%) were normal. The majority of overweight subjects were aged 15-16 years, lived with complete parents, family members ≤4 people, and were domiciled in nuclear families. It was also found that more overweight subjects had mothers with elementary-middle school education and worked, fathers education was senior high school to university and were unemployed, lived in a family with income > minimum wage, and received pocket money ≥IDR 20,000 per day. The results of binary logistic regression analysis showed that the mother employment status (p=0.045) and the pocket money earned per day (p=0.031) were related to the incidence of being overweight among female adolescents (Table 2).

Table 2. The relationship between demographic conditions and the incidence of overweight among female adolescents in Tasikmalaya City, West Java, Indonesia

Variable	Overweight				*p-value*	*cOR*[#] (95%*CI*)
	Overweight (n=51)		Normal (n=224)			
	n	%	n	%		
Age						
13-14	47	18.1	213	81.9	0.405	0.607 (0.185-1.989)
15-16	4	26.7	11	73.3		1.00
Family Status						
Single	4	16.0	21	84.0	0.731	0.823 (0.270-2.540)
Complete	47	18.8	203	81.2		1.00
Number of Family Members						
>4 person	25	17.2	120	82.8	0.666	0.833 (0.453-1,531)
≤4 person	26	20.0	104	80.0		1.00
Family type						
Extended Family	7	13.0	47	87,0	0.326	0,599 (0,254-1,416)
Nuclear Family	44	19.9	177	80,1		1,00
Mother' education						
Elementary, junior high school.	15	25.0	45	75.0	0.205*	1.657 (0.835-3.289)
Senior high school, university	36	16.7	179	83.3		1.00
Father' education						
Elementary, junior high school.	7	13.7	44	86.3	0.434	0.651 (0.275-1.543)
Senior high school, university	44	19.6	180	84.4		1.00
Mother's Employment Status						
Work	21	26.6	58	73,4	0.045**	2.003 (1.064-3.772)
Not-work	30	15.3	166	84,7		1.00
Father s Employment Status						

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Variable	Overweight				*p-value*	*cOR*[#] (95%*CI*)
	Overweight (n=51)		Normal (n=224)			
	n	%	n	%		
Work	5	2.8	16	72.6	0.724	0.413 (0.493-4.053)
Not-work	46	18.1	208	8.9		1.00
Family income						
≥ Minimum wage	23	20,7	88	79.3	0.545	1.269 (0.688-2.344)
< Minimum wage	28	17.1	136	82.9		1.00
Pocket money						
≥ IDR 20,000,-	42	22.2	147	77.8	0.031**	2.444 (1.131-5.284)
< IDR 20,000,-	9	10.5	77	89.5		1.00

*significant *p*<0.25; **significant *p*<0.05; [#]*cOR=crude Odd Ratio*; 1.00 as reference

Examining daily activity habits, this study showed that overweight subjects spent more screen time >3 hours per day, had napping habits, with naps lasting >1 hour per day, slept <7 hours per day, and had more light physical activity. Binary logistic regression results showed that light physical activity was associated with the incidence of overweight (p=0.032) (Table 3).

Table 3. The Relationship between daily activity habits and the incidence of overweight among female adolescents in Tasikmalaya City, West Java, Indonesia

Variable	Overweight				*p-value*	*cOR*[#] (95%CI)
	Overweight (n=51)		Normal (n=224)			
	n	%	n	%		
Length of Screen Time						
>3 hours per day	48	20.5	186	79.5	0.074*	3.269 (0.967-11.044)
≤3 hours per day	3	7.3	38	92.7		1.00
Nap Habits						
Yes	36	21.2	134	78.8	0.205*	1.612 (0.834-3.115)
No	15	14.3	90	85.7		1.00
Length of Nap						
>1 hour	24	21.2	89	78.8	0.422	1.348 (0.731-2.485)
≤1 hour	27	16.7	135	83.3		1.00
Length of Sleep						
<7 hours a day	20	24.1	63	75.9	0.165*	1.649 (0.875-3.105)
≥7 hours per day	31	16.1	161	83.9		1.00
Physical Activity						
Light	50	20.6	193	79.4	0.032**	8.031 (1.070-60.267)
heavy	1	3.1	31	96.9		1.00

*significant *p*<0.25; **significant *p*<0.05; [#]*cOR=crude Odd Ratio;* 1.00 as reference

The majority of overweight subjects did not have habits of eating breakfast, with a frequency of ≤3 times a week. Most of the subjects also had habits of eating <3 per day as well as snacking and consuming SSB frequently. The binary logistic regression test showed that breakfast habits, snacking, and SSB consumption were related to the incidence of overweight among female adolescents with p<0.05.

Table 4. The relationship between eating habits and the incidence of overweight among female adolescents in Tasikmalaya City, West Java, Indonesia

Variable	Overweight				*p-value*	*cOR*[#] (95%CI)
	Overweight(n=51)		Normal (n=224)			
	n	%	n	%		
Breakfast Habits						
No	18	29.0	44	71.0	0.026**	2.231 (1.151-4.327)
yes	33	15.5	180	84.5		1.00
Frequency of Breakfast						
≤3 times per week	34	28.1	87	71.9	0.001**	3.149 (1.659-5.980)
>3 times per week	17	11.0	137	89.0		1.00
Frequency of Meal						
<3 times per day	43	24.0	136	76.0	0.002**	3.478 (1.561-7.747)
≥3 times per day	8	8.3	88	91.7		1.00
Snacking Habits						
Often	45	37.5	75	62.5	0.001**	14.900 (6.083-36.498)

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Variable	Overweight				*p-value*	*cOR*[#] (95%CI)
	Overweight(n=51)		Normal (n=224)			
	n	%	n	%		
Rare	6	3.9	149	96.1		1.00
SSB Habits						
Often	30	24.4	93	75.6	0.035**	2.2012 (1.085-3.732)
Rare	21	13.8	131	86.2		1.00
Fruit Consumption Habits						
Rare	29	20.7	111	83.7	0.431	1.342 (0.727-2.477)
Often	22	16.3	113	50.4		1.00
Fruit Consumption Habits						
Rare	25	18.7	109	81.3	1.00	1.014 (0.552-1.864)
Often	26	18.4	115	81.6		1.00

*significant *p*<0.25; **significant *p*<0.05; [#]cOR=*crude Odd Ratio;* 1.00 as reference

Before multiple logistic regression modeling, bivariate variable selection was first carried out using binary regression modeling with the results of 12 variables. After modeling 8 times, 11 variables were obtained and included in the final model. The results of modeling using multiple logistic regression showed that the variable length of sleep <7 hours per day, low physical activity, frequency of breakfast <3 times a week, and frequent snack habits were considered risk factors for overweight among female adolescents with p<0.05 after considering other variables (Table 5).

Table 5. Logistic regression modeling of demographic variables, daily activity, and eating habits related to overweight among female adolescents in Tasikmalaya City, West Java, Indonesia

Variabel	*p-value*	*aOR*[#](95%CI)
Mother's education		
Elementary, junior high school	0.449	1.427 (0.568-3.582)
Senio high school, universities		1.00
Mother' employment		
Work	0.260	1.621 (0.699-3.761)
Not-work		1.00
Pocket money		
≥IDR 20,000	0.081	2.276 (0.905-5,724)
< IDR 20,000		1.00
Screen Time		
>3 hours a day	0.461	1,704 (0,413-7,035)
≤3 hours a day		1,00
Nap Habits		
Yes	0.298	0.629 (0.263-1,507)
No		1.00
Length of Sleep		
<7 hours per week	0.017**	3.020 (1,218-7.486)
≥7 hours per week		1.00
Physical Activity		
light	0.008**	19.251 (2.170-170.790)
Heavy		1.00
Frequency Berakfast		
≤3 times per week	0.033**	2.418 (1.074-5.443)
>3 times per week		1.00
Frequency of Meal		
< 3 times per day	0.052	2,643 (0,991-7,050)
≥3 times per day		1,00
Snacking Habits		
Often	0.000**	15.922 (5.782-43.846)
Rare		1.00
SBB Consumption Habits		
Rare	0.763	1.133 (0.502-.2,555)
Often		1.00

*significant *p*<0.05; [#]aOR=*adjusted Odd Ratio;* 1.00 as reference

The World Health Organization (WHO) defines excess weight as an abnormal condition or excessive accumulation of fat that poses a health risk. Overweight in children and adolescents aged <18 years is defined epidemiologically using BMI adjusted for age and sex due to physiological changes during growth[29]. Based on the

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results, the prevalence of overweight subjects (18.5%) was above the figure reported in the national data (2018)[18], namely 16% of female adolescents aged 13–15 years and 15.9% of those aged 16–18 years.

In this study, the risk factors for overweight included sleeping <7 hours per day, low physical activity, frequency of breakfast <3 times a week, and frequent snacking habits. Being overweight is a consequence of sustained positive energy resulting from an imbalance between food intake and physical activity habits[30]. Lilik Hidayanti et al, (2023) showed that the increased risk of overweight/obesity (OW/OB) in female adolescents was related to food intake, dominated by snacks[20]. Furthermore, unhealthy food consumption habits and skipping breakfast may increase the risk of being overweight[31]. When an individual skips breakfast, the fasting time becomes longer, which increases the concentration of ghrelin[32]. This peptide hormone stimulates hunger and appetite, thereby increasing the desire to eat. Skipping breakfast is associated with changes in appetite and decreased feelings of fullness, eventually leading to overeating[34].

For children, missing breakfast may prompt food consumption at school, given their extended hours on campus from 7.30 to 15.00 WIB. The presence of snacks at school can help overcome hunger due to the consequence of not eating breakfast[35]. In addition, the cheap price of snacks is also in line with the pocket money of school children[36]. The results were consistent with Nisak & Mahmudiono, (2017) stating that school children who often consume snacks had a greater risk of becoming overweight[37]. School children more often consume fried and sweet snacks alongside drinks with high energy content[38–40]. High energy consumption contributes to excessive energy storage in the body tissues, marking the onset of being overweight[41].

In this study, light physical activity was also identified as a risk factor for being overweight among female adolescents. Physical activity is defined as any movement produced by the skeletal or muscular system of the body that can increase energy expenditure[42]. Thayna Bezerra et al, (2023) found a negative relationship between moderate to heavy activity and BMI among school children [43]. In this study, it was also found that sleeping <7 hours per day increased the risk of being overweight among female adolescents. Biologically, short sleep duration is related to changes in metabolic hormones such as decreased leptin and increased ghrelin levels. These changes in hormone levels are associated with increased appetite, which in turn can lead to overeating and elevated BMI[44]. According to Sofie Litsfeldt et al, (2020), adolescents who sleep <7 hours per day have a higher risk of becoming overweight[25].

This study has several weaknesses, including the use of a cross-sectional design, limiting the ability to describe a cause-and-effect relationship. Additionally, reliance on questionnaires to measure lifestyle variables including screen time and frequency of sleeping, as well as eating habits introduced a subjective element dependent on the honesty of the subject. Despite these weaknesses, this study has the advantage of measuring almost all of lifestyle behaviors of female adolescents, including daily activity and eating habits.

CONCLUSIONS

In conclusion, several lifestyle habits were identified as risk factors for being overweight among female adolescents after considering demographic variables. These included sleeping <7 hours per day, low physical activity, breakfast frequency ≤3 times per week, and habits of frequently consuming snacks. Based on the results, the government is expected to pay attention to the elevated risk of being overweight by increasing the promotion of Germas (Healthy Community Movement) in school settings and encouraging the consumption of breakfast among students.

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Conflict of Interest and Funding Disclosure

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