

## Relationship between Energy Intake and Obesity Prevalence among Adolescent Girls in Aceh Barat

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### ABSTRACT

The prevalence of adolescent obesity has been shown to differ among regions, and it could be influenced by several factors, including diet, environmental exposures, and lifestyle. Diet is one of the crucial factors that contribute to obesity among adolescents, particularly energy intake. This study was conducted to measure the relationship between energy intake and obesity prevalence among adolescent girls in Aceh Barat Regency. This study is descriptive-analytical research with the design of a cross-sectional study. The population in this study were adolescent girls in Aceh Barat Regency with samples of 50 people. The data were obtained from a one-day 24-hour recall and analyzed using the Chi-Square test with a significance value ( $p= 0.05$ ). The result showed that based on bivariate analysis, there is a relationship between energy intake and body mass index. The study indicated that adolescent girls with excessive energy intake had a 6.67-fold higher risk of obesity than those with adequate energy intake (OR: 6.67, 95% CI: 1.25-35.65).

### ARTICLE INFORMATION

**Submitted:** 30/10/2021

**Revised:** 31/10/2021

**Accepted:** 31/10/2021

**Publish Online:** 06/11/2021

#### Keywords:

Adolescent

Body Mass Index

Energy Intake

Obesity

**How to cite this article:** Hayuningtyas, A., Iskandar, W., Putri, S.E., Safrida, Lubis, A.I., (2021). Relationship between Energy Intake and Obesity Prevalence among Adolescent Girls in Aceh Barat. *Journal of Nutrition Science*, 2 (2), 12-14

### Introduction

Chronic diseases, particularly obesity, have been an emerging health problem in Indonesia for over a decade. Various factors have been discovered to contribute to this emerging trend: nutrition intake, environmental exposures, and lifestyle (Pelletier & Gage, 1995).

Adolescence is a period where there is a change in eating and activity behavior in girls. At this time, adolescents are no longer dependent on parental giving and food choices. Coupled with decreased participation in physical activity and sports, it can cause energy balance to impact weight gain. Currently, adolescents often consume foods based on popular trends without paying attention to the nutritional content (Todd, et al., 2015).

Adolescents' nutrition issues arise because of those inappropriate dietary habits, causing an imbalance

between nutritional intakes and the recommended dietary allowances. If this condition is done continuously, it will cause weight gain (Wirjatmadi, & Adriani, 2012). Weight gain can lead to obesity in adolescents, defined as excessive accumulation of fat in the body (Barasi, 2007). Obesity is caused by an imbalance between energy intake and energy expenditure (Gibney et al., 2009).

In Indonesia, the prevalence of obesity has increased. In 2003, 2007, and 2018 the problem of obesity in Indonesia was 10.5%, 14.8%, and 21.8%. This prevalence tends to increase from year to year. The data from Riskesdas 2018 shows that the prevalence of overweight and obesity is 16.0% in adolescents aged 13-15 years and 13.5% in adolescents aged 16-18 years (Kemenkes, 2018).

Individuals with severe obesity encounter severe and potentially life-threatening complications, including

diabetes, hypertension, hyperlipidemia, asthma, and arthritis (Mokdad et al., 2003). A study by Suchindran, et al., (2010) reported that obese adolescents were significantly more likely to develop severe obesity in young adulthood than normal-weight adolescents (hazard ratio: 16.0, 95%, CI: 12.4-20.5). Obesity increases the risks of mortality and morbidity and hampers the physical and psychological functions that impact the quality of life (Khodijah, et al., 2013).

A study by Nugroho (2020) reported that women have a risk of 0.595-fold higher than men. At the same time, the adolescents (<14 years old) had a risk of 1,490-fold higher than the young adulthood (> 14 years old). Various factors could be the cause of obesity among adolescents. One of the crucial factors is diet, particularly energy intake. This study aims to determine the relationship between energy intake and obesity prevalence among adolescent girls in Aceh Barat.

## Method

This study is descriptive-analytical research with the design of a cross-sectional study. The population in this study were adolescent girls in Aceh Barat Regency, with the number of sample of 50 people. The cross-sectional design was used because the measurement of dependent and independent variables of the study was carried out simultaneously. The dependent variable in this study is body mass index, and the independent variable is energy intake. The data were obtained from a one-day 24-hour recall.

The data obtained were then analyzed using SPSS software. The statistical test methods used in this study include univariate analysis by looking for the frequency distribution and bivariate analysis using the Chi-Square test with a significance value ( $p= 0.05$ ) to see the relationship between energy intake and body mass index.

## Results

**Table 1.** The Frequencies Distribution Category of Energy Intake and Body Mass Index

Variable	Frequency (n)	Percentage (%)
<b>Energy Intake</b>		
Adequate	40	80
Excessive	10	20
<b>Body Mass Index</b>		
Normal	27	54
Obesity	23	46

Table 1. shows that among the population, the percentage of those who have adequate energy intake is 80%, while those who have excess energy intake are 20%. Furthermore, 54% of the population is categorized as normal in the body mass index, while the remaining 46% are classified as obese.

**Table 2.** Chi-Square Test Result of Relationship between Energy Intake and Body Mass Index

Energy Intake	Body Mass Index				Total		P-Value	OR
	Normal		Obesity		n	%		
	n	%	n	%				
Adequate	25	50	15	30	35	80	0.03	6.67
Excess	2	4	8	16	10	20		

\*OR = 6.67 (1.25 - 35.65)

Bivariate analysis results showed that the p-value obtained is 0.03 ( $P<0.05$ ), meaning a relationship between energy intake and body mass index. Based on Table 2. excessive energy intake is highly associated with the higher obesity prevalence (16% out of 20%). Moreover, the analysis indicated that adolescent girls with excessive energy intake had a 6.67-fold higher risk of obesity than those with adequate energy intake (OR: 6.67, 95% CI: 1.25-35.65).

## Discussion

The results of the univariate analysis showed that about 20.6% of adolescent girls have excess energy intake, and 46% were categorized as obese. Excessive energy intake can trigger obesity in individuals if the energy expenditure is less than energy intake.

Nowadays, in Aceh Barat, various foods are widely available in the market, both energy-dense foods and drinks. These foods are considered one of the factors that cause energy intake to be higher than individuals' biological and physiological needs. Besides that, low physical activity levels are also possible contributors to obesity (Ocké et al. 2009).

The bivariate analysis results prove excessive energy intake with the possibility of obesity (Table 2.). Namely, there is a relationship between excess energy intake in adolescent girls with a high prevalence of obesity, 16% from 20% with a risk reaching 6.67-fold higher than in adolescent girls with adequate energy intake (OR: 6.67, 95% CI: 1.25-35.65).

This study was in line with a study by Harahap et al. (2018), which reported that children (6-12 years of age) with excessive energy intake (>100% RDA) had

a higher risk of obesity (OR: 4.2, 95% CI: 1.9-9.3) of being obese than children with adequate energy intakes (=100% RDA). Another report by Pampang et al. (2009) studied the relationship between energy intake and obesity prevalence of junior high school students in Yogyakarta, reporting a significant difference between students who had an adequate energy intake and excessive energy intake on obesity prevalence. Students with excessive energy intake had a 6.9-fold higher risk of obesity than those with sufficient energy intake ( $p < 0.001$ ; OR: 6.9, 95% CI: 3.84-12.59).

Based on this description, it can be concluded that there is an emerging health problem in adolescents regarding the risk of obesity so that efforts to prevent obesity in adolescents are needed by the government and the private sector in the form of community empowerment, health, promotion, and public policy.

### Conclusion

This study concluded that there is a relationship between energy intake and obesity prevalence among adolescent girls. The analysis showed that adolescent girls with excessive energy intake had a 6.67-fold higher risk of obesity than those with adequate energy intake (OR: 6.67, 95% CI: 1.25-35.65). The result indicated that it is necessary to design tactical efforts in community empowerment, health promotion, and public policy to prevent obesity in adolescents by the government and the private sector.

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