
Factors Associated With Chronic Energy Deficiency (Ced) In Adolescent Girls Aged 10-19 In Jambi Province

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Abstract

Chronic Energy Deficiency (CED) is a critical nutritional issue among Indonesian adolescent girls. In Jambi Province, its prevalence shows a fluctuating upward trend, requiring a thorough analysis of risk determinants. This study aimed to determine CED prevalence and analyze its association with macronutrient intake frequency, infectious diseases, hygiene behavior, physical activity, and family size. This quantitative study used a cross-sectional design with 2023 Indonesian Health Survey (SKI) secondary data. The sample consisted of 1,082 adolescent girls (10–19 years) in Jambi Province. Data were analyzed using Chi-square and Cox Regression to identify dominant factors and Prevalence Ratios (PR). CED prevalence was remarkably high at 56.1%, predominantly in the 15–19 age group (51.6%). Nutritional patterns showed infrequent consumption of carbohydrates (51.7%), fats (66.0%), and proteins (58.3%). While most respondents reported good hygiene and no infection history, bivariate analysis showed no significant association with CED. However, multivariate analysis identified light physical activity as the dominant factor significantly associated with CED risk (p -value: 0.045; PR: 1.45; 95% CI: 1.00–2.08). Physical activity is the primary determinant of CED among adolescent girls in Jambi. These findings highlight the urgency for comprehensive nutritional interventions focusing on energy balance and dietary quality.

Keywords: CED, Adolescent girls, MUAC, Physical Activity

INTRODUCTION

Indonesian adolescents face three nutritional burdens simultaneously, one of which is malnutrition (UNICEF Indonesia, 2021). One of the challenges of malnutrition among adolescents in Indonesia is Chronic Energy Deficiency (CED). According to the Basic Health Research (Riskesdas) and the Indonesian Health Survey (SKI) conducted in Indonesia from 2013, 2018, and 2023, adolescent girls in the 15-19 age group have the highest prevalence in the non-pregnant CED category, respectively. The research findings from the Jambi Province section indicate that the prevalence of non-pregnant women with special needs (KE WUS) in Jambi Province fluctuates with an upward trend. In 2013, the figure was 18.2%, in 2018 it decreased to 10.8%, and then increased to 18.1% (Ministry of Health of the Republic of Indonesia, 2013, 2018, 2023).

According to the World Health Organization (WHO), the age of 10-19 is a phase of life spanning from childhood to the transition to adulthood (World Health Organization, 2024). Indonesian Minister of Health Regulation No. 25 of 2014 divides adolescents into three groups: early adolescence (10-13 years), middle adolescence (14-16 years), and late adolescence (17-19 years) (Ministry of Health of the Republic of Indonesia, 2014). This period is a time when adolescents experience numerous changes in all aspects of their lives, including biological, physical, emotional, social, and cognitive development. (Rahayu et al., 2023).

Chronic Energy Deficiency (CED) is a type of malnutrition characterized by a lack of energy and protein intake that is not balanced with the body's nutritional needs over a long period of time (Arni, Angraini, & Zuraida, 2023). Adolescents experiencing CED have short- and long-term impacts on their lives, starting with an increased risk of infectious diseases, hormonal disorders, and decreased cognitive abilities. In the long term, the impacts of CED continue into motherhood, including suboptimal productivity, the emergence of anemia, premature birth, low birth weight (LBW), delayed growth and mental development in children, and intellectual decline, which directly reduces the

quality of human resources and can increase the risk of death (Damayanti, Dewi, & Kusnandar, 2023; Lahade, Talahatu & Nur, 2022).

Based on the aforementioned background, researchers are interested in analyzing factors associated with the risk of CED in adolescent girls in Jambi Province using the 2023 SKI provided by the Indonesian Ministry of Health.

RESEARCH METHODS

The method used in this study is secondary data analysis or secondary research, where the data were obtained from the results of the SKI 2023. The study design used a cross-sectional design (cross-sectional study) to compare the differences between diseases in exposed and unexposed groups (Murti, 2003). The selected location was the entire region in Jambi Province as a whole, consisting of 11 districts and 2 cities as part of it. The population in this study was all adolescent girls aged 10-19 years in all areas of Jambi Province, included in the SKI 2023 sample, totaling 1143 respondents. The sample that had passed the inclusion and exclusion criteria amounted to 986 respondents, and after weighting to maintain population representativeness, the total sample became 1,082 respondents. Data analysis used the complex sample method, a method commonly used in national data analysis or surveys, in taking 2-stage samples. Data processing uses univariate tests to determine the frequency distribution of each variable, and bivariate tests use Chi-square with CI: 95% to determine the relationship between variables using PR.

RESULTS AND DISCUSSION

Frequency Distribution of Research Variables

Table 1 shows that the majority of respondents were adolescent girls aged 15-19 years (51.6%). Regarding macronutrient intake, the highest proportions were in the rare category for carbohydrate intake frequency (51.7%), fat intake frequency (66%), and protein intake frequency (58.3%). Almost all respondents had not experienced an infectious disease in the past month (99%) and had good handwashing habits (71.9%). Respondents showed the highest proportion of light physical activity (50.9%). The majority of respondents were in small family groups (75.4%).

Table 1. Frequency Distribution

Variable	Frequency	Percentage (%)
CED Status		
CED	607	56,1
Not CED	475	43,9
Adolescent Age		
10-14 Years	523	48,4
15-19 Years	558	51,6
Carbohydrate Intake Frequency		
Poor	559	51,7
Good	523	48,3
Fat Intake Frequency		
Poor	715	66
Good	367	34
Protein Intake Frequency		
Poor	631	58,3
Good	451	41,7
Infectious Disease		
Infection	11	1
No Infection	1071	99

Handwashing Behavior		
Poor	304	28,1
Good	778	71,9
Physical Activity		
Light	551	50,9
Moderate	198	18,3
Heavy	333	30,8
Family Size		
Large	266	24,6
Small	816	75,4

Source: Secondary data analysis, Indonesian Health Survey 2023.

The relationship between the frequency of carbohydrate intake, the frequency of fat intake, the frequency of protein intake, infectious diseases, hand washing behavior, physical activity and family size with the risk of chronic energy deficiency (CED)

The results of the study on the relationship between the frequency of carbohydrate intake, frequency of fat intake, frequency of protein intake, infectious diseases, hand washing behavior, physical activity, and family size with the risk of CED in adolescent girls can be seen in Table 2. Table 2 shows that all independent variables that have been tested, including the frequency of carbohydrate consumption, frequency of fat consumption, frequency of protein consumption, infectious diseases, hand washing behavior, physical activity, and family size, did not have a significant relationship with the risk of CED in adolescent girls (p-value = > 0.05).

Table 2. Relationship between frequency of carbohydrate intake, frequency of fat intake, frequency of protein intake, infectious diseases, hand washing behavior, physical activity and family size with the risk of KEK

Variable	CED						PR	95%CI	P-Value
	Yes		No		Total				
	n	%	n	%	n	%			
Carbohydrate Frequency Intake									
Poor	331	59,3	228	40,7	559	100	1,30	0,96-1,77	0,089
Good	276	52,7	247	47,3	523	100			
Fat Frequency Intake									
Poor	385	53,9	329	46,1	715	100	0,76	0,55-1,06	0,115
Good	222	60,4	146	39,6	367	100			
Protein Frequency Intake									
Poor	363	57,4	269	42,6	631	100	1,13	0,82-1,57	0,433
Good	245	54,3	206	45,7	451	100			
Infectious Disease									
Infection	9	80,1	22	19,9	11	100	3,17	0,76-13,1	0,092
No Infection	598	55,9	473	44,1	1071	100			
Handwashing Behavior									
Poor	161	53	143	47	304	100	0,83	0,59-1,18	0,321
Good	446	57,3	332	42,7	778	100			
Physical Activity									
Light	334	60,6	217	39,4	551	100	1,46	1,01-2,1	0,075
Moderate	103	51,9	95	48,1	198	100	1,02	0,65-1,61	
Heavy	171	51,2	162	48,8	333	100			
Family Size									

Large	152	57,3	114	42,7	266	100	1,0	0,76-1,48	0,707
Small	455	55,7	361	44,3	816	100			

Source : Secondary data analysis, Indonesian Health Survey 2023.

The results of the bivariate analysis showed that the frequency of macronutrient intake consisting of carbohydrates, fats, and proteins did not have a significant relationship with the risk of CED in adolescent girls in Jambi Province ($p > 0.05$). This may occur because the research instrument only measured the frequency of intake, not the specific amount consumed. Factors related to food intake can occur when adolescent girls consume more foods that are high in calories but low in nutrients, such as junk food and other low-nutrient foods that are easily accessible. Adolescents can be susceptible to nutritional deficiencies even though they have a normal nutritional status (Telisa & Eliza, 2020). The occurrence of deficiencies between intake and malnutrition in adolescents can be caused by other factors, where low family income tends to influence food purchases to meet a person's nutritional needs (Jannah, Afrinis, & Lasepa, 2023). In meeting the body's intake for each person, inadequate dietary habits in the past can be a reason for the effect of CED in someone (Mufidah & Kisnawaty, 2024). Furthermore, the unrelated frequency of macronutrient intake may occur due to temporal ambiguity. Given that MUAC is formed from a person's nutrition over a long period, this can occur when adolescent girls have had insufficient intake in the past, leading to CED, or adolescents have experienced CED in the past, so that neither frequent nor infrequent food intake is a cause of CED.

Infectious diseases were not significantly associated with the risk of CED in adolescent girls in Jambi Province ($p > 0.05$). The majority of respondents had no history of infectious diseases. This lack of association may be due to only 5% of the sample population suffering from diarrhea, so the relationship between diarrhea and MUAC is not clearly discernible. However, this study suggests that this may occur because women of childbearing age have an adequate dietary intake, which can compensate for the body's nutritional needs during diarrhea (Putri, Jus'at, Sitoayu, Melani, & Palupi, 2022).

Handwashing behavior was not associated with the risk of CED in adolescent girls ($p > 0.05$). Personal hygiene practices play a crucial role in determining the nutritional intake of the body. UNICEF states that sanitation is an indirect factor influencing a person's nutritional status. Sanitation activities can prevent the body from infectious diseases that can reduce nutritional status (UNICEF, 2020). Unhygienic conditions lead to infections that can lead to malnutrition, and this cycle continues (Khan et al., 2022). However, this study showed that many respondents who practiced good handwashing still experienced CED, meaning that good handwashing behaviors need to be accompanied by good nutritional intake for adolescent girls.

Family size was not associated with the risk of CED in adolescent girls ($p > 0.05$). The risk of malnutrition stems not only from the number of family members but also from the role of the head of the family and in-laws in managing nutrition and health behaviors, as well as family income and eating habits, which can influence the occurrence of CED (Febry, Etrawati, & Arinda, 2020). UNICEF shows that adequate family income, sufficient knowledge, especially from parents regarding nutrition, and a good eating culture within the family can support the fulfillment of good and nutritious food intake and be sufficient for the whole family so that nutrition can be met, both for large family members and small family members (UNICEF, 2020).

Table 3 Results of logistic regression analysis of various KEK risk variables

Variable	B	PR (95% CI)	p-value
Infection Disease	1,106	3,02 (0,72-11,9)	0,124
Physical Activity (Light)	0,372	1,45 (1-2,08)	0,045
Physical Activity (Moderate)	0,016	1,01 (0,62-1,54)	0,944

Source: Secondary data analysis, Indonesian Health Survey 2023.

Bivariate analysis of physical activity showed no association with the risk of CED in adolescent girls. However, multivariate analysis showed a relationship between light physical activity and CED in adolescent girls. The WHO recommends that adolescents engage in moderate to vigorous physical activity and avoid sedentary behavior to provide numerous benefits to the body, including physical, mental, and cognitive health (World Health Organization, 2022). Regular, moderately vigorous physical activity can build muscle, leading to a larger MUAC. Meanwhile, respondents engaged in light physical activity, which tends to be less effective in building muscle mass. However, this study assumes that adolescents experiencing CED have already experienced CED, resulting in a weakened physique that leads them to choose to limit their physical activity.

CONCLUSION

Light physical activity is the dominant factor influencing the risk of CED. The prevalence of CED in adolescent girls in Jambi Province is 56.1%. Furthermore, there is no significant relationship between the frequency of variable intake (carbohydrates, fat, protein), infection factors, sanitation behavior, and the number of families with CED status ($p\text{-value} > 0.05$). Based on these findings, it is recommended that the government in Jambi Province increase health promotion programs that focus on encouraging an active lifestyle and a balanced nutritional diet to reduce the prevalence of CED among adolescents. Future researchers are advised to conduct further studies using other variables, incorporating both secondary and primary data in Jambi Province.

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