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Correlation of Knowledge Level with Body Mass Index and Chronic Energy Deficiency in Female Teenagers

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ABSTRACT

Background: In 2020, the prevalence of chronic energy deficiency (CED) in female teenagers aged 15–19 years in Indonesia, using the upper arm circumference (UAC) measurement indicator, was 36.3%, indicating that nutritional problem was a serious problem in female teenagers because they affect their health status. In addition to UAC, body mass index (BMI) indicates nutritional status in female teenagers. Knowledge is an indirect factor in nutritional problems in female teenagers. However, knowledge is an important variable that can be changed through health education.
Purpose: Analyzing the correlation between knowledge level with CED and BMI in female teenagers.
Methods: This study used the quantitative method with a cross-sectional approach. The research sample was 88 female teenagers at Madrasah Aliyah Negeri (MAN) 2 Sleman, collected using purposive sampling. The research instruments were questionnaires, measurement sheets, microtoise, weight scales, and UAC measuring tapes. The data analysis used chi-square.
Results: Most of the knowledge level of female teenagers is in the Poor category (73.9%). Most female teenagers have a normal BMI (69.3%) and do not suffer from CED (68.2%). Most female teenagers with the knowledge level in the Poor category have a normal BMI (73.8%) and do not suffer from CED (66.2%). There is no correlation between the knowledge level of female teenagers with BMI (p-value = 0.163) and CED (p-value = 0.492).
Conclusion: There is no correlation between the level of knowledge of female teenagers with CED and BMI at MAN 2 Sleman. However, the incidence of CED was found to be 31.8%, so further CED handling intervention is recommended.

Keywords: *BMI; CED; Knowledge; Nutrition*

INTRODUCTION

Chronic energy deficiency (CED) is a condition characterized by long-term nutritional deficits, particularly in energy and protein, affecting adolescent girls and women (Zaki & Sari, 2019). The risk of developing CED is identified when an individual's mid upper arm circumference (MUAC) measures less than 23.5cm. This condition often results from

insufficient intake of macronutrients, especially energy and protein, which can also lead to inadequate micronutrient consumption. For adolescent girls with CED, inadequate treatment may result in persistent effects, including diminished academic performance. Malnutrition significantly contributes to reduced academic achievement and school attendance (Zerga et al., 2022). Furthermore, CED can negatively impact pregnancy, potentially causing complications such as anemia, preterm labor, low birth weight (LBW) infants, stunted offspring, and even maternal mortality (Suarjana et al., 2020) The occurrence of chronic energy deficiency (CED) among adolescent girls (aged 15–19 years old).

In 2020, the prevalence of chronic energy deficiency (CED) in female teenagers aged 15–19 years in Indonesia was 36.3%, indicating that nutritional problem was a serious problem in female teenagers because they affect their health status (Ministry Of Health., 2021). In addition to UAC, body mass index (BMI) indicates nutritional status in female teenagers. Knowledge is an indirect factor in nutritional problems in female teenagers. However, knowledge is an important variable that can be changed through health education. The aim of the study is to analyzing the correlation between knowledge level with CED and BMI in female teenagers.

MATERIALS AND METHODS

This study used the quantitative method with a cross-sectional approach. The independent variable of this study is the level of knowledge and the dependent variable is body mass index and chronic energy deficiency.The research sample was 88 female teenagers at *Madrasah Aliyah Negeri (MAN) 2 Sleman*, collected using purposive sampling. The research instruments were questionnaires, measurement sheets, microtoise, weight scales, and UAC measuring tapes. The data analysis used chi-square.

RESULTS

Tabel 1. Univariate Analysis Results (n= 88)

Variabel	Kategori	Frequency (f)	Percentage (%)
Nutritional Status (BMI)	Skinny Weight	6	6,8
	Mildly Thin	7	8,0
	Normal	61	69,3
	Light Fat	7	8,0
	Heavy Fat	7	8,0
Chronic Energy Deficiency (CED)	CED	28	31,8
	No CED	60	68,2
Nutritional Knowladge	Less	65	73,9
	Simply	23	26,1

Table 1 shows that the most of the knowledge level of female teenagers is in the *Poor* category (73.9%). Most female teenagers have a normal BMI (69.3%) and do not suffer from CED (68.2%).

Table 2. The correlation between the level of knowledge of female teenagers with BMI

Variable	Categoric	Body Mass Index (BMI)										Total		*p-value*
		Skinny Weight		Mildly Thin		Normal		Light Fat		Heavy Fat				
		f	%	f	%	f	%	f	%	f	%	f	%	
Nutritional Knowladge	Less	3	4.6	6	9,2	48	73,8	3	4,6	5	7,7	65	100	0,163
	Simply	3	13,0	1	4,3	13	56,5	4	17,4	2	8,7	23	100	

Based on the table 2, it can be seen that the most female teenagers with the knowledge level in the *Poor* category have a normal BMI (73.8%). There is no correlation between the knowledge level of female teenagers with BMI (*p*-value = 0.163)

Table 3. The correlation between the level of knowledge of female teenagers with CED

Variable	Categoric	Chronic Energy Deficiency (CED)				Total		*p-value*
		CED		No CED				
		f	%	f	%	f	%	
Nutritional Knowladge	Less	22	33,8	43	66,2	65	100	0,492
	Simply	6	26,1	17	73,9	23	100	

Table 3 shows that most female teenagers with the knowledge level in the *Poor* category do not suffer from CED (66.2%). There is no correlation between the knowledge level of female teenagers with CED (*p*-value = 0.492).

DISCUSSION

Knowledge about nutrition is knowledge about food and nutrients, sources of nutrients in food, foods that are safe to consume so as not to cause disease and how to prepare good food so that nutrients are absorbed, to process food properly so that the nutrients in food not lost and how to live healthy (Adriani & Wirjatmadi, 2016). In this study, it was found that the most of the knowledge level of female teenagers is in the poor category (73.9%). This figure is greater than the results of research by Teesen et al (2024) in Kualalumpur, Malaysia which showed that half of by female teenagers have knowledge that is classified poor (50.0%). This is different from the results of the study in senior high school in Kupang City where most respondents had sufficient knowledge (79%)(Pantaleon, 2019).

Adolescent nutritional status is a body condition that arises due to the balance between consumption and expenditure of nutrients. Various physiological changes that occur in adolescents cause the assessment of nutritional status in adolescents to receive special attention. Assessment of nutritional status can be known through anthropometric measurements and calculating the body mass index. In this study, it was found that most of the female teenagers at MAN 2 Sleman have a normal BMI (69.3%). This is supported by Teesan's research which shows that out of 96 respondents, almost half of the respondents (46.9%) had normal BMI (Teesen et al., 2024). Likewise, Arista's research also showed that more than half of the BMI of respondents is normal (69.6%). (Arista et al., 2017).

The majority of female teenagers in this study do not suffer from CED (68.2%). This is different from the research findings of Khayatunnisa et al (2021) which showed that most of the adolescent girls at SMK Swagaya 1 Purwokerto experienced CED (56%) (Khayatunnisa & Permata Sari, 2021) and research by Arista et al (2017) which found 45.70% of adolescent girls at SMK Islamic Center Baiturrahman Semarang experienced CED (45.70%). (Arista et al., 2017). This is the case with the research results based on the results of upper arm circumference measurements, the prevalence of adolescent girls Poka-Rumah Tiga Village, Ambon who experienced CED was 45.8% (Ardianto et al., 2024).

In this study, it was found that there was no correlation between the knowledge level of female teenagers with BMI. This is not supported by Teesan's research which proves that there is a relationship between a good level of knowledge and body mass index. The chi-square test showed that respondents whose body mass index was in the normal category had good knowledge (Teesen et al., 2024). Knowledge is essential in overt behavior and in shaping existing behavior. Knowledge is therefore a very important domain for shaping one's actions (Notoatmodjo, 2014). However, research in Kupang showed that there was no significant relationship between nutrition knowledge and nutritional status as measured by BMI (Pantaleon, 2019). The reason for the absence of a relationship between knowledge and BMI is because knowledge gives an indirect influence on nutritional status, while the direct causes of nutritional problems are nutrient intake and infectious diseases (Supariasa, 2016).

There is no correlation between the level of knowledge about nutrition of female teenagers with CED at MAN 2 Sleman. Similarly, the result of research in Semarang (2017) showed that there was no relationship between knowledge about nutrition and CED (Arista et al., 2017). These results are not in accordance with research in Langsa City, Aceh which states that there is a significant relationship between knowledge and the incidence of CED ($p = 0.001$) (Hamzah, 2017). The study stated that the better the knowledge, the lower the risk of experiencing CED. The results of the study are also not in accordance with research in Banjarmasin which states that there is a relationship between knowledge and the incidence of CED ($p = 0.002$) (Palimbo & Firdaus, 2014).

CONCLUSIONS

There is no correlation between the level of knowledge of female teenagers with CED and BMI at MAN 2 Sleman. However, the incidence of CED was found to be 31.8%, so further CED handling intervention is recommended.

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CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. This research has received ethical approval from the Ethics Commission for Health Research of the Faculty of Health Sciences, Respati University Yogyakarta number:

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