Correlation Level of Energy Consumption Level of Protein and Body Image Prevalency CED in Shafta High School Surabaya

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ABSTRACT

One of the nutritional problems in adolescents is Undernutrition, which can be caused by inadequate energy and protein intake. A contributing factor to the lack of intake is body image. Undernutrition can lead to decreased learning concentration and have implications for future pregnancy. To determine the relationship between energy and protein consumption levels and body image with the prevalence of Undernutrition in Shafta Surabaya High School. This study is analytical observational research using the SQ-FFQ 2-week form to determine energy and protein consumption levels and the BSQ form to assess body image. The percentage of female students with severe energy deficit consumption (52.9%), severe protein deficit consumption (41.2%), and positive body image (84.3%) is high. The prevalence of Undernutrition is 47.1%. The Spearman correlation test results show a significant relationship between energy and protein consumption levels and body image with Undernutrition prevalence. Most respondents have severe energy and protein deficit, positive body image, and a high prevalence of Undernutrition. There is a significant relationship between energy and protein consumption levels and body image among female adolescent's Further research is needed to explore adolescents' knowledge regarding the ideal body shape.

INTRODUCTION

Nutritional issues represent a multifaceted and complex problem.[1] One prominent concern is adolescent girls, a group vulnerable to nutritional deficiencies, necessitating the implementation of nutritional management programs.[2] It is crucial to pay attention to the balanced dietary intake of adolescent girls to ensure their preparedness for pregnancy in the future.[3] Additionally, a short-term risk that may arise is a decrease in concentration levels for learning.[4] According to the Indonesian Ministry of Health, the Basic Health Research survey results show a prevalence of Chronic Energy Deficiency (CED) in East Java in 2018 at 33.5%.[5]

CED has many contributing factors, with the primary ones being inadequate energy and protein intake.[6] Intake can be influenced by economic, socio-cultural, psychosocial factors, or excessive concern over body shape, commonly referred to as body image. Body image can affect dietary intake.[7] When anxiety about body shape emerges, individuals may adopt various methods to achieve an ideal body shape, including following strict diets or reducing food intake.[8]

Numerous studies have demonstrated that CED is caused by insufficient energy and protein intake to meet bodily needs. Adolescent girls are 11.5 times more likely to suffer from CED if their

protein intake is insufficient and 9.4 times more likely to suffer from CED if their energy intake does not meet their needs.[9] Given the issues presented above, the author is interested in exploring the relationship between energy and protein consumption levels and body image with the prevalence of CED at Shafta High School in Surabaya, supported by preliminary study results conducted on November 4, 2022. An accidental sampling technique was used at Shafta High School and involved 20 respondents to measure the Upper Arm Circumference, showing a 45% prevalence of CED among female students.

MATERIALS AND METHODS

The conducted research is an observational study with a cross-sectional design. The study was carried out at Shafta High School, Surabaya, in January 2023. A total of 51 out of 103 female students were selected as respondents through random sampling techniques. The variables used include the prevalence of Undernutrition (CED) among adolescent girls as the dependent variable, and energy and protein consumption levels, as well as body image, as independent variables. In conducting the study, interview techniques were utilized to ascertain energy and protein consumption levels with the aid of the SQ-FFQ form over two weeks, and body image was assessed using the Body Shape Questionnaire (BSQ). In addition to interviews, Mid Upper Arm Circumference (MUAC) measurements were conducted using a MUAC tape. MUAC measurements were taken three times, and the average was used for accurate results.[10]

Data processing included editing, coding, data entry, and data cleaning. To analyze the data, the researchers used two analyses: univariate and bivariate analysis.[11] Univariate analysis determined the frequency distribution, and bivariate analysis identified the relationships between variables.[12] In this study, the Spearman test was utilized for bivariate analysis because the Kolmogorov-Smirnov test indicated that the data were not normally distributed.[13]

RESULTS

1. Respondent characteristics

a. Age

Data on the age of female teenagers at Shafta High School, Surabaya, is presented as below :

Table 1 Frequency Distribution of Age among Female Teenagers at Shafta High School, Surabaya, 2023

Age	Frekuensi	
	n	%
13-15	16	31.4
16-18	35	68.6
Total	**51**	**100**

Source : Primary data (2023)

According to the table, the majority of respondents are aged between 16-18 years, totaling 35 out of 51 respondents (68.8%). Meanwhile, 16 out of 51 (31.4%) are aged 13-15 years.

b. Class

Data on the respondent's class at Shafta High School, Surabaya, is presented as follows:

Table 2 Frequency Distribution of Class among Female Teenagers at Shafta High School, Surabaya, 2023

Class	Frequency	
	n	%
Class X-1	6	11.8
Class X-2	8	15.7
Class X-3	10	19.6
Class X-4	8	15.7
Class XI-IPS1	6	11.8
Class XI-IPS2	8	15.7
Class XI-MIPA	5	9.8
Total	**51**	**100.0**

Source : Primary data (2023)

The table indicates that the students come from 7 different classes, with the majority being from class X-3, accounting for 10 out of 51 respondents (19.6%).

c. Eating Frequency

Data on the eating frequency of respondents at Shafta High School, Surabaya, is presented as follows:

Table 3 Frequency Distribution of Eating among Female Teenagers at Shafta High School Surabaya, 2023

Eating Frequency	Frequency	
	n	%
Regular	18	35.3
Irregular	33	64.7
Total	**51**	**100**

Source: Primary data (2023)

The table indicates that the majority of students have an irregular eating frequency, totaling 33 out of 51 respondents (64.7%).

2. Frequency Distribution

a. Frequency Distribution of Energy and Protein Consumption

Data on the level of energy and protein consumption among respondents at Shafta High School, Surabaya, is presented as follows:

Table 4 Frequency Distribution of Energy and Protein Consumption among Female Teenagers at Shafta High School Surabaya, 2023

Consumption Level	Energy Frequency		Tingkat Konsumsi Protein	Frekuensi	
	n	%		n	%
Lebih	3	5,9	Lebih	11	21,6
Normal	17	33,4	Normal	11	21,6
Defisit Ringan	0	0	Defisit Ringan	4	7,8
Defisit Sedang	4	7,8	Defisit Sedang	4	7,8
Defisit Berat	27	52,9	Defisit Berat	21	41,2
Total	**51**	**100**	**Total**	**51**	**100**

Source: Primary data (2023)

The table reveals that the majority of respondents exhibit a severe deficit in energy consumption, with 27 out of 51 respondents (52.9%), and a severe deficit in protein consumption, with 21 out of 51 respondents (41.2%).

b. Frequency Distribution of Body Image

Data on body image among respondents at Shafta High School, Surabaya, is presented as follows:

Table 5 Frequency Distribution of Body Image among Female Teenagers at Shafta High School, Surabaya, 2023

Body Image Category	Frequency	
	n	%
Positive Body Image	43	84.3
Negative Body Image	8	15.7
Total	**51**	**100**

Source: Primary data (2023)

The table shows that 43 out of 51 respondents (84.3%) possess a positive body image.

c. Frequency Distribution of Prevalence of Chronic Energy Deficiency (CED)

Data on the prevalence of CED among respondents at Shafta High School, Surabaya, is presented as follows:

Table 6 Frequency Distribution of Prevalence of CED among Female Teenagers at Shafta High School Surabaya, 2023

Nutritional Status	Frequency	
	n	%
Chronic Energy Deficiency (CED)	24	47.1
Normal	27	52.9
Total	**51**	**100**

Sumber : Data primer (2023)

The table indicates that the prevalence of female teenagers with KEK status is 24 out of 51 (47.1%).

3. Cross-Tabulation Tables

a. Relationship Between Energy Consumption Level and CED Prevalence

Correlation data on the level of energy consumption and the prevalence of Chronic Energy Deficiency (CED) is presented as follows:

Table 7 Frequency Distribution of Body Image among Female Adolescents at Shafta High School, Surabaya in 2023

Body Image Category	Frequency	
	n	%
Positive Body Image	43	84.3
Negative Body Image	8	15.7
Total	**51**	**100**

Sumber : Data primer (2023)

According to the table, it is explained that the majority of the students have a positive body image, amounting to 43 out of 51 respondents (84.3%).

b. Relationship Between Protein Consumption Level and CED Prevalence

Data on the correlation test between protein consumption level and CED prevalence is presented as follows:

Table 8 Correlation Test of Protein Intake with CED Prevalence among Female Adolescents at Shafta High School Surabaya, in 2023

No	Protein Consumption Level	CED Prevalence						P-value	R
		CED		Not CED		Total			
		n	%	n	%	n	%		
1	Higher	1	9.1	10	90.9	11	100	0.001	0.622
2	Normal	1	9.1	10	90.9	11	100		
3	Mid Deficit	1	25	3	75	4	100		
4	Moderate Deficit	4	100	0	0	4	100		
5	Severe Deficit	17	81	4	19	21	100		
	Total	**24**	**47.1**	**27**	**52.9**	**51**	**100**		

* Spearman's rank correlation test

Sumber : Data primer (2023)

According to the table, it is explained that the majority of students with a severe protein consumption deficit have a nutritional status of CED. The Spearman correlation test shows a P-value < 0.05, indicating a correlation between protein consumption level and CED prevalence.

c. Relationship Between Body Image and CED Prevalence

Data on the correlation test between body image and CED prevalence is presented as follows.

Table 9 Correlation Test of Body Image with CED Prevalence among Female Adolescents at Shafta High School Surabaya, in 2023

No	Body Image	Prevalensi CED						P-value	R
		CED		Tidak CED		Total			
		n	%	n	%	n	%		
1	*Body Image* Positif	21	48,8	22	51,2	43	100	0,001	0,583
2	*Body Image* Negatif	3	37,5	5	62,5	8	100		
	Total	24	47,1	27	52,9	51	100		

* korelasi spearman rasio test

Sumber : Data primer (2023)

According to the table, it is explained that the majority of students with negative body image have a nutritional status of CED. The Spearman correlation test shows a P-value < 0.05, indicating a relationship between body image and CED prevalence.

d. Relationship Between Body Image and Energy Consumption Level

Data on the correlation test between body image and energy consumption level is presented as follows:

Table 10 Correlation Test of Body Image with Energy Consumption Level among Female Adolescents at Shafta High School Surabaya, in 2023

No	Body Image	Energy Consumption Level										P-value	R
		Higher		Normal		Moderate deficit		Severe deficit		Total			
		n	%	n	%	n	%	n	%	n	%		
1	Positive	2	4.7	14	32.6	4	9.3	23	53.5	43	100	0.025	0.313
2	Negative	1	12.5	3	37.5	0	0	4	50	8	100		
	Total	3	5.9	17	33.3	4	7.8	27	52.9	51	100		

* Spearman's rank correlation test

Sumber : Data primer (2023)

According to the table, it is explained that the majority of students with negative body image have a severe energy consumption deficit. The Spearman correlation test shows a P-value < 0.05, indicating a relationship between body image and energy consumption level.

e. Relationship Between Body Image and Protein Consumption Level

Data on the correlation test between body image and protein consumption level is presented as follows:

Table 11 Correlation Test of Body Image with Protein Consumption Level among Female Adolescents at Shafta High School, Surabaya, in 2023

No	Body Image	Protein Consumption Level												P-value	R
		Higher		Normal		Mid Deficit		Moderate Deficit		Severe Deficit		Total			
		n	%	n	%	n	%	n	%	n	%	n	%		
1	Positive	9	20.9	9	20.9	3	7	4	9.3	18	41.9	43	100	0.061	0.264
2	Negative	2	25	2	25	1	12,5	0	0	3	37.5	8	100		
	Total	11	21.6	11	21.6	4	7.8	4	7.8	21	41.2	51	100		

* Spearman's rank correlation test

Sumber: Data primer (2023)

According to the table, it is explained that the majority of students with a negative body image predominantly have a severe deficit in protein consumption. However, the Spearman correlation test, showing a P-value > 0.05, indicates that there is no correlation between body image and protein consumption level.

DISCUSSION

1. Frequency Distribution of Energy and Protein Consumption Levels

Based on the results of the SQ-FFQ over two weeks, it was found that the majority of adolescent girls have energy and protein consumption levels that are considered insufficient. One contributing factor is the lack of meal frequency (only 1-2 times per day). Additionally, the portion and variety of food consumed do not align with the balanced nutrition guidelines. According to Regulation of the Minister of Health No. 41 of 2014, eating habits of less than three times a day and the consumption of a limited variety of food can lead to inadequate nutritional intake.[14] Another study by Hasutut RM, 2020, also suggests that the intake of energy and protein among adolescent girls is relatively low, with 76.1% having insufficient food intake.[15]

2. Frequency Distribution of Body Image

Based on the results of the BSQ questionnaire, it was observed that students have a positive or good body image, attributed to many respondents feeling confident with their bodies. Many of them expressed that the ideal body shape, according to them, is thin and slender. Body image is a perspective on body shape based on societal standards.[16] Another researcher, Agustiningsih, 2019, mentioned that the high rate of positive body image is influenced by sociocultural factors.[17]

3. Distribusi Frekuensi Prevalensi CED

The prevalence of CED among adolescent girls at Shafta High School, Surabaya, is relatively high, at 47.1%, compared to the CED prevalence based on RISKESDAS, which is only 37.3%.[5] This is attributed to the relatively low consumption of energy and protein among respondents. CED is a nutritional problem that can be caused by many factors, but the most crucial is the intake of

nutrients, especially energy and protein, which does not meet the body's needs over a long period.[18]

4. Relationship Between Energy and Protein Consumption Levels and CED Prevalence

Based on statistical test results, there is a significant relationship between energy and protein consumption levels and CED prevalence among adolescent girls at Shafta High School, Surabaya. Most respondents have a low meal frequency, often skip breakfast, and frequently consume junk food. Eating just to be full and not paying attention to balanced nutrition over a long period can lead to the deterioration of subcutaneous fat tissue, commonly referred to as CED.[19] Another researcher, Telisa, 2020, mentioned that there is a relationship between energy and protein consumption levels and CED in adolescent girls.[20]

5. Relationship Between Body Image and CED Prevalence

Based on the Spearman test results, there is a significant relationship between body image and CED prevalence among adolescent girls at Shafta High School, Surabaya. The BSQ questionnaire results show that the majority of adolescent girls have a positive body image, which may be due to a lack of knowledge among adolescents about the ideal body shape. Many adolescent girls have an ideal body shape, which is thin and slender, regardless of their nutritional status. Therefore, those with CED nutritional status are confident in their body shape. Adolescent girls tend to have the perspective that the ideal body shape is not based on nutritional status.[21] nother researcher, Marlina, 2020, stated that young women's knowledge is influenced by existing beauty standards.[22]

6. Relationship Between Body Image and Energy and Protein Consumption Levels

Based on the Spearman test results, there is a correlation between energy consumption level and body image, but protein consumption level is not related to body image. This is because adolescent girls tend to consume snacks rather than main meals. Many respondents reduce the frequency of main meals and replace them with snack or snack consumption with the aim of reducing weight. Body image can influence eating habits.[23] Adolescent girls tend to think that main meals can increase weight, and they will lose confidence if there is a change in body shape.[24] Another study by Zulfa, 2023, also mentioned that there is no relationship between protein consumption level and body image.[25]

CONCLUSION

Based on the research findings, it can be concluded that there is a relationship between the levels of energy and protein consumption and the prevalence of CED, which is attributed to the respondents' consumption of energy and protein falling within a significant deficit category. From the correlation test results, it is also observed that there is a relationship between the body image variable and the prevalence of CED, indicating correlations among variables, except between the body image variable and protein consumption levels. This is due to the intake of the students being

far from the body's needs. Many students believe that an ideal body is a thin shape, in line with existing assessments. Therefore, they have a positive body image or feel proud of their bodies, even though their nutritional status is still classified as CED.

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