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THE RELATIONSHIP BETWEEN MACRONUTRIENT AND MICRONUTRIENT INTAKE ON CED IN ADOLESCENT GIRLS IN MAN 1 ACEH BARAT

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Abstract

Chronic Energy Deficiency (CED) is a condition when a person experiences chronic malnutrition that causes health problems in adolescent girls, with an Upper Arm Circumference (LILA) size of less than 23.5 cm. Based on the results of initial observations made by researchers by observing several high schools, after researchers observed that in MAN 1 West Aceh there were several young women with CED justification. This study aims to determine the relationship between macronutrient and micronutrient intake on the incidence of Chronic Energy Deficiency (CED) in adolescent girls in MAN 1 West Aceh. The research method uses a cross-sectional approach carried out in MAN 1 West Aceh. Proportionnate Stratified Random Sampling sampling technique with a total of 261 people in MAN 1 West Aceh. The instrument used is the Semi Quantitative Food Frequency Questionnaire. Data analysis using Chi Square Test and Logistic Regression. The results showed that there was a significant relationship between carbohydrate, protein, fat intake and CED in adolescent girls with a p-value of 0.000 ($p<0.05$), there was no significant relationship between iron and CED in adolescent girls with a p-value of 0.083 ($p>0.05$), there was no significant relationship between calcium and CED in adolescent girls with a p-value of 0.735 ($p>0.05$), There was no significant association between zinc and CED in adolescent girls with a p-value of 0.374 ($p>0.05$). Based on the results of research and discussion, it can be concluded that there is a relationship between macronutrient intake of CEDs in adolescent girls with p-value (<0.05), while micronutrient intake has no significant relationship with CED in adolescent girls with p-value (>0.05). Itis hoped that the school can carry out nutritional status assessment activities for students so that information and education can be provided related to the importance of paying attention to the nutritional status of female students who fall into the category of women of childbearing age (WUS) for health preparation and nutritional status in adulthood. It is better for teenagers to pay attention to a good diet according to their needs.

Keywords: **CED, Macronutrients, Micronutrients, Young Women**

INTRODUCTION

Adolescence comes from the Latin word adolescence which means "Growth" or "Development towards maturity" (Mariyati &; Vanda, 2021). Group of adolescents aged 10-19 years. The growth and development of the younger generation is increasingly rapid both in terms of physical, mental, and functional, as well as increasing food needs. Currently, lack of macro and micronutrients will inhibit the growth of adolescents so that it has an impact on their health and nutrition. According to Zaki & Sari (2019), the younger generation is a group that is prone to experiencing food problems, especially chronic energy shortages. If not treated early, this can attack adolescents until they become pregnant. Adolescence can lead to many problems, including eating disorders. Adolescents with Chronic Energy Deficiency (CED) is an important nutritional problem that occurs in many adolescent groups. The reason is due to lack of nutritional intake, the reason people eat so little is due to economic and psychosocial reasons such as fashion. Young people seem to have a higher risk of developing various infectious and hormonal diseases that negatively affect their health, which can be prevented with a balanced and healthy diet (Indonesian Ministry of Health, 2018).

Chronic energy deficiency in women of childbearing age is currently the focus of attention of the government and health workers. This is because women of childbearing age who experience chronic energy deficiency have a high risk of giving birth to children with chronic energy deficiency later in life. In addition, malnutrition causes health problems (morbidity, mortality and disability) and also reduces the quality of human resources. More broadly, malnutrition can threaten the resilience and survival of a nation (Sandalayuk, 2019).

Chronic Energy Deficiency (CED) is a condition where people suffer from food shortages for years, causing health problems (Edowai, 2018). CED is a form of malnutrition in which the mother is chronically malnourished, resulting in relative or severe health impairment in the mother of one or more nutrients. This is because women and children are the groups most at risk of suffering from energy deficiency (Bhattacharya, 2020).

Africa and Asia, particularly in sub-Saharan and Southeast Asia, are central to global poverty and chronic malnutrition because the majority of the population lives in remote or rural areas. The rate of chronic malnutrition from 777 million in 2015 increased to 815 million in 2018 and it is estimated that at least about 120 million of the women (60%) living in South and Southeast Asia have CEDs (World Health Organization, 2018). Meanwhile, the prevalence of underweight and stunting in East Africa is 15.8% and 26.6% respectively (Wubie A et al, 2020).

Based on data from Indonesia's health profile (2018), the proportion of women of childbearing age at risk of CED aged 15-19 years is 46.6%. At the age of 20-24 years it is as much as 30.6%. In addition, at the age of 25-29 as much as 19.3%. And at the age of 30-34 as much as 13.6%. This shows that the proportion of WUS (Women of Childbearing Age) CED risk has increased within 7 years (Husna et al., 2020). Based on health research data in Aceh Province, the prevalence of CED risk in women of childbearing age is 21% (Aceh Health Profile, 2019 in Aguayo Torrez, 2021). Based on the results of initial observations made by researchers by observing several high schools, after researchers observed that in MAN 1 West Aceh there were several young women with CED justification

LITERATURE REVIEW

Youth is the wealth of a nation in creating a good future generation. Adolescence is a time of rapid changes in physical, cognitive, and psychosocial or behavioral growth. Adolescence is the transition from childhood to adolescence, many changes occur due to increased muscle mass, increased body fat, and hormonal changes. These changes affect their nutritional needs and diet. Adolescence is the transition from childhood to adulthood and includes the development of all aspects or functions to reach adulthood (Maiti and Bidinger, 2016). In the regulation of the Minister of Health of the Republic of Indonesia Number 25, adolescents are categorized into the age group of 10-18 years where this period is a transition period from children to adults.

Adolescence is a time when very specific nutritional problems arise. The complex hormonal interactions necessary for the normal development of adolescents, linear growth and changes in the development of the nervous system cannot occur without good nutrition. The younger generation is very vulnerable to diseases due to infections, accidents, malnutrition, suboptimal growth, and malnutrition which is a serious problem. The eating habits and physical activity of adolescents greatly affect the health and adequacy of their food intake. Nutritional needs in the form of energy, protein, iron, calcium and others increase during puberty to support optimal growth and development. A common nutritional problem in adolescents is nutritional deficiency which can trigger chronic energy deficiency (Telisa and Eliza, 2020).

Chronic energy deficiency (CED) is one of the conditions of malnutrition, where there is a lack of food intake for a long time, a matter of years which results in health problems. If the size of the Upper Arm Circumference (LILA) is less than 23.5 cm, it means that it is at risk of CED, and it is estimated that giving birth to a low birth weight baby (Supariasa, 2016).

The factors affecting chronic lack of energy in women of childbearing age are divided into two, namely. Direct and indirect factors. The immediate factors are infectious diseases and food consumption. While indirect factors include family food, education, maternal knowledge, family income and health services (Sandalayuk, 2019). Chronic lack of energy is caused by a lack of one or more essential nutrients in the body. Lack of nutrients in the body can be caused by several things, namely the amount of nutrients consumed is insufficient, poor quality, or both. In addition, the body may not absorb or use the nutrients consumed (Lubis, L.A., Lubis, 2015). Food intake affects a person's nutritional status. Poor maternal nutrition before and during pregnancy can cause fetal growth retardation, low birth weight (BBLR), impaired infant brain growth and development, and an increased risk of illness and death (Sekartika 2013). A healthy diet is a diet that meets the Daily Value (RDA). Recommended Dietary Allowance (RDA) is the level of consumption of essential nutrients that can meet the needs of almost all healthy individuals (Supariasa et al., 2012). The nutritional value of a food ingredient can be seen from the food composition table (DKBM) (Atmarita, 2005).

METHOD

This study was conducted observationally, quantitative and used a cross sectional approach to describe correlations. The population of this study was all female students in MAN 1 West Aceh, as many as 261 people, so the sampling method in this study was carried out by probability sampling. The instrument used in this study was the LILA tape. Data processing is carried out computerized. Univariate test to determine the characteristics of the subject and the prevalence of each class. Bivariate tests are performed to determine the relationship between independent and bound variables, known by doing a chi-square test with CI: 95%. Multivariate tests are used to see which variables have the most influence on CEDs using logistic regression tests

RESULTS AND DISCUSSION

Results

1. Frequency Distribution of Class Characteristics

Table. 1 Frequency Distribution of Class Characteristics in MAN 1 West Aceh

Class	n	%
Grade 10	87	33,3%
Grade 11	92	35,2%
Grade 12	82	31,4%
Total	**261**	**100**

Based on table 4.1 above, it is known that class 10 with 87 people (33.3%), class 11 with 92 people (35.2%), and class 12 with 82 people (31.4%).

2. Bivariat Analysis (Chi-Square)

Table 2. The Relationship of Macronutrient and Micronutrient Intake to CEDs

Research Variables	Chronic Lack of Energy				*P-Value*
	SOME		No CAKE		
	n	%	n	%	
Asupan Karbohidrat					*0,000*
Good	0	0,0%	1	0,4%	
Less	4	20,7%	20	7,7%	
More	75	28,7%	111	42,5%	
Asupan Protein					
Good	124	47,5%	92	35,2%	0,000
Less	5	1,9%	34	13,0%	
More	0	0,0%	6	2,3%	
Asupan Lemak					
Good	125	47,9%	99	37,9%	0,000
Less	4	1,5%	27	10,3%	
More	0	0,0%	6	2,3%	
Asupan Zat Besi					
Good	129	49,4%	127	48,7%	0,083
Less	0	0,0%	4	1,5%	
More	0	0,0%	1	0,4%	
Asupan Kalsium					
Good	3	1,1%	4	1,5%	0,735
Less	26	10,0%	22	8,4%	
More	100	38,3%	106	40,6%	
Asupan Zinc					
Good	128	49,0%	129	49,4%	0,374
Less	1	0,4%	1	0,4%	
More	0	0,0%	2	0,8%	

Based on the table above, the results of the bivariate analysis of this study show that there is a significant relationship between macronutrient intake, namely carbohydrates, proteins, fats and CEDs with *p-value* (<0.05). While the intake of micronutrients namely iron, calcium, zinc there was no significant relationship with CED with *p-value* (>0.05).

3. Multivariat Analysis (Regresi Logistic)

Table 3. Selection of Multivariate Candidates for Macronutrient and Micronutrient Intake of CEDs in Young Women in MAN 1 West Aceh.

Variable	CED (Chronic Lack of Energy)			
	Model 1 **95% CI** **P**	**Model 2** **95% CI** **P**	**Model 3** **95% CI** **P**	**Model 4** **95% CI** **P**
Karbohidrat	3,321 (1,802-6,120) 0,000	3,356 (1,817-6,198) 0,000	3,477 (1,963-6,160) 0,000	
Protein	6,486 (1,616-26,028) 0,008	9,221 (3,493-24,338) 0,000		9,561 (3,688-24,787) 0,000
Lemak	1,731 (0,342-8,765) 0,508			
R^2	**0,249**	**0,247**	**0,098**	**0,176**

Based on the table above, it can be seen in model 1 that three multivariate candidates were obtained, namely carbohydrates with an OR value of 3.321 p-value 0.000 (p<0.25), proteins with an OR value of 6.486 p-value 0.008 (p<0.25), and fats with an OR value of 1.731 p-value 0.508 (p<0.25), model 2 obtained candidate 2 mutivariates, namely carbohydrates with an OR value of 3.356 p-value 0.000 (p<0.05), and protein with an OR value of 9.221 p-value 0.000 (p<0.05), in model 3 with carbohydrates as a multivariate candidate with an OR value of 3.477 p-value 0.000 (p<0.05), while in model 4 with protein as a multivariate candidate with an OR value of 9.561 p-value 0.000 (p<0.05). Thus, the results of carbohydrate and protein intake were obtained which were more influential on CEDs with each significance value of 0.000 (p<0.05).

Discussion

1. Bivariat Analysis

1) The Relationship of Carbohydrate Intake to CEDs in Young Women

The results showed that there was a relationship between carbohydrate intake and CED in adolescent girls in MAN 1 West Aceh with chi-square analysis, obtained a p-value of 0.000 ($p<0.05$). Data collection of carbohydrate intake was carried out using a semi-quantitative food frequency questionnaire. Based on the results of SQ-FFQ interviews consumed in the last 1 month, most of the carbohydrate intake with less categories who experienced CEDs did not exist, those who did not experience CEDs were 1 respondent, with normal categories who experienced CEDs as many as 54 respondents and those who did not experience CEDs as many as 20 respondents, while with more categories who experienced CEDs were 75 respondents and those who did not experience CEDs were 111 respondents. This happens because most teenagers tend to consume carbohydrates not according to exchangers and foods that are not varied.

2) The Relationship of Protein Intake to CEDs in Young Women

The results showed that there was a relationship between protein intake and CED in adolescent girls in MAN 1 West Aceh with chi-square analysis, obtained a p-value of 0.000 ($p<0.05$). Data collection of carbohydrate intake was carried out using a semi-quantitative food frequency questionnaire. Based on the results of SQ-FFQ interviews consumed in the last 1 month, most of the protein intake with less categories who experienced CEDs as many as 124 respondents and those who did not experience CEDs as many as 92 respondents, with normal categories who experienced CEDs as many as 5 respondents, and those who did not experience CEDs as many as 34 respondents, while more categories who experienced CEDs did not exist, and those who did not experience CEDs as many as 6 respondents.

3) The Relationship of Fat Intake to CEDs in Young Women

The results showed that there was a relationship between protein intake and CED in adolescent girls in MAN 1 West Aceh with chi-square analysis, obtained a p-value of 0.000 ($p<0.05$). Data collection of carbohydrate intake was carried out using a semi-quantitative food frequency questionnaire. Based on the results of SQ-FFQ interviews consumed in the last 1 month, most of the fat intake with less categories who experienced CEDs as many as 125 respondents, and those who did not experience CEDs as many as 99 respondents, with normal categories who experienced CEDs as many as 4 respondents and those who did not experience CEDs as many as 27 respondents, while more categories who experienced CEDs did not exist and those who did not experience CEDs as many as 6 respondents. This happens because most adolescents tend to consume fat not in accordance with the needs of daily fat intake and RDA needs.

4) The Relationship of Iron Intake to CEDs in Young Women

The results showed that there was no relationship between iron intake and CED in adolescent girls in MAN 1 West Aceh with chi-square analysis, obtained a p-value of 0.083. Data collection of carbohydrate intake was carried out using a semi-quantitative food frequency questionnaire. Based on the results of SQ-FFQ interviews consumed in the last 1 month, most of the iron intake with less categories who experienced CEDs as many as 129 respondents, and those who did not experience CEDs as many as 127 respondents, with normal categories who experienced no CEDs and those who did not experience CEDs as many as 4 respondents while more categories who experienced CEDs did not exist and those who did not experience CEDs as many as 1 respondent. This happens because most teenagers tend to consume iron intake in small amounts.

5) The Relationship of Calcium Intake to CEDs in Young Women

The results showed that there was no relationship between calcium intake and CED in adolescent girls in MAN 1 West Aceh with chi-square analysis, obtained a p-value of 0.735. Data collection of carbohydrate intake was carried out using a semi-quantitative food frequency questionnaire. Based on the results of SQ-FFQ interviews consumed in the

last 1 month, most of the calcium intake with less categories who experienced CEDs as many as 3 respondents, and those who did not experience CEDs as many as 4 respondents, with normal categories who experienced CEDs as many as 26 respondents and those who did not experience CEDs as many as 22 respondents, while more categories who experienced CEDs as many as 100 respondents and those who did not experience CEDs as many as 106 respondents. This happens because most adolescents in MAN 1 West Aceh tend to consume calcium not as recommended by the RDA.

6) The Relationship of Zinc Intake to CEDs in Young Women

The results showed that there was no relationship between zinc intake and CED in adolescent girls in MAN 1 West Aceh with chi-square analysis, obtained a p-value of 0.374. Data collection of carbohydrate intake was carried out using a semi-quantitative food frequency questionnaire. Based on the results of SQ-FFQ interviews consumed in the last 1 month, most of the calcium intake with less categories who experienced CEDs as many as 128 respondents and those who did not experience CEDs as many as 129 respondents with normal categories who experienced CEDs as many as 1 respondent and those who did not experience CEDs as many as 1 respondent, while based on more categories who experienced CEDs did not exist and those who did not experience CEDs as many as 2 respondents. This happens because most adolescents tend to consume zinc not according to the recommended RDA.

2. Multivariate Analysis (Regresi Logistic)

The results of the logistic regression test in table 4.14 found that among the variables of carbohydrate, protein and fat intake. The variable protein intake that showed the strongest association with OR was 9,561 compared to other variables affecting CED risk in adolescent girls. This suggests that macronutrient intake influences the incidence of chronic energy deficiency in adolescent girls.

CLOSING

Conclusion

Based on the results of research and discussion, it can be concluded that:

1. There is a significant relationship between carbohydrate intake in CEDs in MAN 1 West Aceh with a p-value of 0.000 ($p<0.05$).
2. There is a significant relationship between protein between carbohydrate intake in CEDs in MAN 1 West Aceh with a p-value of 0.000 ($p<0.05$).
3. There was a significant relationship between fat and carbohydrate intake in CEDs in MAN 1 West Aceh with a p-value of 0.000 ($p<0.05$).
4. There was no relationship between iron intake in CEDs in MAN 1 West Aceh with a p-value of 0.083 ($p>0.05$).
5. There was no relationship between calcium intake in CEDs in MAN 1 West Aceh with a p-value of 0.735 ($p>0.05$).
6. There is no relationship between zinc intake against KEK in MAN 1 West Aceh with p-value 0.374 ($p>0.05$).
7. Based on the results of a multivariate test using the regression method, it was found that protein intake was more influential on CEDs in MAN 1 West Aceh with an OR value of 9,561.

Suggestions and Acknowledgments (if any)

It is expected that the school can carry out nutritional status assessment activities for students so that information and education can be provided related to the importance of paying attention to the nutritional status of female students who fall into the category of women of childbearing age (WUS) for health preparation and nutritional status in adulthood. It is better for teenagers to pay attention to a good diet according to their needs.

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