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Consumption Pattern and Nutritional Status Related to Adolescent Dysmenorrhea

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ABSTRACT

Background: Adolescent women will experience puberty which is marked by the occurrence of menstruation. During menstruation, adolescents will experience problems such as menstrual pain or dysmenorrhea. The aim of this study was to determine the relationship between consumption patterns and nutritional status with adolescent dysmenorrhea.
Method: This study uses an analytical survey design with a cross sectional approach. Subjects were selected by purposive sampling, namely adolescent girls' class XI MIPA 1-4, totaling 84 people. Data were analyzed using Pearson's test to determine the significance of the relationship between consumption patterns and nutritional status to adolescent dysmenorrhea.
Result: This study showed a significant relationship between nutritional status and the incidence of dysmenorrhea in class XI students at SMA Negeri 2 Toraja Utara ($p<0.05$; $r=0.0224$). In addition, this study did not find any relationship between the level of energy and carbohydrate adequacy with the incidence of dysmenorrhea ($p>0.05$). The results of the statistical test showed $r = -0.039$, which means that there is a weak relationship in a negative direction between the incidence of dysmenorrhea and the frequency of carbohydrate consumption, and $p = 0.726$, which means that there is a relationship but not significant. This study also shows the results of statistical tests $r = -0.036$ and $p = 0.743$, which means that there is a weak and insignificant relationship between the incidence of dysmenorrhea and the frequency of consumption of caffeine sources.
Conclusion: Based on the research that has been done, it can be concluded that the incidence of dysmenorrhea in most respondents is in the moderate level category and the nutritional status of respondents is generally in the normal category.

Keywords: ***Dysmenorrhea, Consumption Pattern, Adolescent, Nutritional status;***

INTRODUCTION

Adolescence is a period of change from childhood to adulthood, which is 11-20 years old.[1] Changes experienced by individuals at that age are physical, emotional, and psychological changes. Adolescence is also marked by the work of the reproductive glands in adolescents, which is called puberty. Individual puberty varies. In women, puberty is marked by the onset of menstruation. During menstruation, adolescents will experience problems such as menstrual pain or dysmenorrhea, namely pain experienced by a woman during menstruation. Dysmenorrhea mostly occurs at the age of 16-25 years and is most commonly felt at the age of 17-20 years[1]. The effects of dysmenorrhea can be pain in the lower abdomen, pelvis, and thighs. The occurrence of adolescent dysmenorrhea reduces adolescent productivity, making it difficult to concentrate when carrying out daily activities[1].

Dysmenorrhea is experienced by 90% of women worldwide and more than 50% of these women experience primary menstrual pain.[2.] Research in the United States shows that almost 95% of women experience menstrual pain[2]. Based on research by the Center for Information and Counseling on Adolescent Reproductive Health (PIK-KRR), there are 72.89% of women who experience primary dysmenorrhea, 27.11% of women who experience secondary dysmenorrhea, and around 49-45% of women of reproductive age who experience dysmenorrhea[3].

Adolescents are not having varied diet and small quantities. Lack of variety in consumption of staple foods, vegetables, and fruits causes the needs and adequacy of energy and nutrients for adolescents in a state of deficiency. Based on the results of research in Medan, 77.5% of adolescents consume foods that are not diverse[4]. In addition, 87.5% of adolescents avoid foods that have a high carbohydrate content because they think these foods are driving factor for weight gain[4]. This will affect the growth and development which results in individuals susceptible to disease[3]. Research in 2019 found that there was no relationship between nutritional status and the incidence of primary dysmenorrhea with the results of the study that 18 respondents (24.3%) had normal nutritional status and experienced dysmenorrhea[5]. Meanwhile, adolescents with underweight and overweight nutritional status do not experience dysmenorrhea[5]. Another study in 2017 stated that the incidence of dysmenorrhea in adolescents was significantly related, with the results of the study that 82.85% of adolescents who experienced dysmenorrhea mostly had underweight nutritional status and 17.15% of adolescents did not experience dysmenorrhea with obese nutritional status[6]. Previous research also stated that the lack of dietary consumption patterns of magnesium sources caused the incidence of dysmenorrhea in adolescent girls with the results of the study that 83% of adolescents experienced dysmenorrhea with low magnesium intake, namely 38.3%[3]. Another study stated that lack of iron consumption was the cause of dysmenorrhea with the results showing 38.3% of adolescents had insufficient iron intake and experienced moderate menstrual pain, while 10.6% of adolescents had good iron intake and experienced light menstruation[7].

This study was conducted to complement the results of previous studies which mostly only showed the relationship between micronutrients and the incidence of adolescent dysmenorrhea. Based on the description above, this study aims to determine the relationship between consumption patterns and nutritional status and its relation to adolescent dysmenorrhea due to differences in consumption patterns and nutritional status in adolescents.

METHODS

This study uses an analytical survey design with a cross sectional approach, which collects data at the same time to determine the correlation between risk factors and effects. This research was conducted at SMA Negeri 2 Toraja Utara, Rantepao District, North Toraja Regency, South Sulawesi, in January-April 2022. The subjects used in this study were selected by purposive sampling, namely adolescent girls in class XI MIPA 1-4, totaling

84 people. The inclusion criteria for this study were: 1) 15-18 years old, 2) had experienced menarche, and 3) in good health. The exclusion criteria were 1) adolescents who were not present during the study and 2) adolescents who were sick at the time of the study. Prior to filling out the questionnaire, the subject will be given informed consent which contains an explanation of the research objectives as a sign of approval to participate in the study. Dysmenorrhea data was assessed using a closed questionnaire, a total of 8 questions containing the occurrence or non-occurrence of dysmenorrhea, the level of pain experienced, the body part experiencing pain, the impact of dysmenorrhea, and the efforts made when experiencing dysmenorrhea. The questionnaire was filled in according to the circumstances that occurred in the research subject, with a mild category if the total score obtained was <25, moderate if the total score was 23-35, and severe if the total score was >35. Body weight was measured with a tread scale with an accuracy of 0.1 kg and body height using a microtoise with an accuracy of 0.1 cm. Nutritional status data was obtained based on the results of the calculation of BMI/A. The nutritional status of the subject is said to be severely thinness if they have a BMI <-3 SD, thinness -3 SD to <-2 SD, normal -2 SD to +1 SD, overweight +1 SD to +2 SD, and obesity >+2 SD[8].

The consumption patterns that will be studied are energy intake, carbohydrate intake, frequency of consumption, types of carbohydrates, and sources of caffeine. Energy and carbohydrate intake data were obtained by 24-h repeated recall and analyzed based on the level of adequacy. Energy and carbohydrate intake is categorized as a severe deficit if the amount of nutrients consumed is <70% of the total nutritional adequacy rate (RDA). Moderate deficit if 70-79%, mild deficit 80-89%, normal 90-120%, and more if >120%[9]. Data on carbohydrate and caffeine sources as well as their consumption frequency were measured by direct interviews with subjects using the form food frequency questionnaire (FFQ). This form contains food ingredients and the frequency of food consumption in a certain time with the category of; rarely if it is consumed 1-2 times a month, sometimes if it is consumed 3-5 times a week, and always if it is consumed 2-3 times a day[5]. The data obtained is then carried out by editing, entry, processing, and cleaning processes. Furthermore, univariate analysis was carried out to describe the distribution of variables based on percentages and averages. Prior to the correlation analysis, the normality test of the data was first performed. The results of the data normality test using the *Kolmogorov-Smirnov* method showed that the data were normally distributed. Statistical analysis using Pearson's test to determine the significance of the relationship between the independent variable and the dependent variable, namely the relationship between consumption patterns and nutritional status in relation to dysmenorrhea using the SPSS application. Using a 95% confidence level with details of p-value >0.05, the results were not significant and p-value <0.05 showed significant results.

RESULT

Table 1. Distribution of Respondents' Dysmenorrhea Level in SMA Negeri 2 Toraja Utara

Respondent's Dysmenorrhea Level	**n**	**%**
Moderate	54	64,3
Severe	30	35,7
Total	**84**	**100**

The results showed that there were no respondents with mild dysmenorrhea, but most respondents experienced moderate dysmenorrhea (64.3%). Almost all respondents experienced interference with activities when experiencing dysmenorrhea and experienced complaints such as menstrual pain in the pelvis and lower abdomen, difficulty walking, and difficulty concentrating.

Table 2. Frequency Distribution of Respondents Nutritional Status in SMA Negeri 2 Toraja Utara

Respondents Nutritional Status	**n**	**%**
Thinness	4	4,8
Normal	75	89,3
Overweight	4	4,8
Obesity	1	1,2
Total	**84**	**100**

Based on the results of anthropometric measurements, the distribution of the nutritional status of respondents with thinness (4.8%), overweight (4.8%) and obesity (1.2%).

In this study, there were 2 respondents (2.4%) deficit energy intake and 5 respondents (6%) with energy intake that was more than the adequate level. Furthermore, there is a severe deficit (1.2%) with an intake that is more than adequate as much as 13.1% in the respondent's carbohydrate intake.

Table 3. Frequency Distribution of Energy and Carbohydrate Adequacy Levels

Nutrient adequacy level	**n**	**%**
Energy *kkal/hr*	1879,5(1108;3359)	
Energy sufficiency		
Severe deficit	2	2,4
Moderate deficit	8	9,5
Light deficit	19	22,6
Normal	50	59,5
Over	5	6
Total	**84**	**100**
Carbohydrates *g/hr*	289,6(141;491)	
Carbohydrates sufficiency		
Severe deficit	1	1,2
Moderate deficit	6	7,1
Light deficit	12	14,3
Normal	54	64,3
Over	11	13,1
Total	**84**	**100**

Table 4. Frequency Distribution of Sources of Carbohydrate and Caffeine Consumption in SMA Negeri 2 Toraja

Food Source	**Frequency**									
	>1x a day		3-5x a week		1-2x a month		Never		Total	
	n	%	n	%	n	%	n	%	n	%
Carbohydrate										
Rice	84	100	0	0	0	0	0	0	0	0
Noodles	2	2,38	52	61,90	29	34,52	1	1,19	84	100
Potato	1	1,19	19	22,62	59	70,24	5	5,95	84	100
Cassava	1	1,19	25	29,76	54	64,29	4	4,76	84	100
Bread	3	3,57	71	84,52	9	10,71	1	1,19	84	100
Corn	1	1,19	29	34,52	49	58,33	5	5,95	84	100
Average	**15**	**18**	**33**	**39**	**33**	**40**	**3**	**3**	**84**	**100**
Caffeine										
Tea	13	15,5	50	59,52	12	14,29	9	10,71	84	100
Coffee	3	3,57	23	27,38	18	21,43	40	47,62	84	100
Chocolate	11	13,1	45	53,57	28	33,33	0	0	84	100
Soft drink	2	2,38	33	39,29	37	44,05	12	14,29	84	100
Average	**7**	**9**	**38**	**45**	**24**	**28**	**15**	**18**	**84**	**100**

The results showed that the average respondent who never consumed 6 types of carbohydrates for 1 month was 3 people (3%). Based on the results of the

study on average, respondents who consumed 4 types of food and beverages containing caffeine >1x a day were 7 people (9%).

Table 5. The Relationship between Nutritional Status and consumption with Respondent's Dysmenorrhea Incidence

Variable	Dysmenorrhea incident	
	r	p-value
Nutritional Status	0,0224	0,041*
Nutritional Adequacy Level		
Energy	-0,159	0,147
Carbohydrate	0,148	0,178
Frequency Carbohydrate and caffeine consumption		
Carbohydrat	-0,039	0,726
Caffeine	-0,036	0,743

The correlation is significant if the p value <0.05

Table 5 shows that nutritional status is significantly related to the incidence of dysmenorrhea (p>0,05) but not significantly related on nutritional adequacy level and frequency consumption of carbohydrate and caffeine.

DISCUSSION

This study showed a significant relation between nutritional status and the incidence of dysmenorrhea in class XI students in SMA Negeri 2 Toraja Utara with a low relation strength in the positive direction (p> 0.05; r = 0.0224). This study is in line with the results of a study entitled the relationship between nutritional status and the incidence of dysmenorrhea in adolescent girls at SMA MTA Surakarta which stated that there was a relationship between nutritional status and the incidence of dysmenorrhea in adolescents (p<0,05)[10]. Malnutrition status can occur because the body lacks the nutrients needed by the body. While the nutritional status of overweight and obesity can occur because of the excess amount of energy intake that is stored in the form of fat reserves. Severe dysmenorrhea is generally experienced in people with overweight and obese nutritional status[14]. Dysmenorrhea that occurs in respondents with poor nutritional status is caused by a lack of food intake which will cause disturbances in the function of body organs and disruption of reproductive function[6]. Meanwhile, dysmenorrhea experienced by respondents with overweight and obese nutritional status is due to the presence of excessive fat tissue which will cause hyperplasia of blood vessels. This pressure on blood vessels by fatty tissue causes the blood that should flow during menstruation to experience disturbances, resulting in pain[10]. Overnutrition status in adolescent girls causes an increase in androgen hormones to produce estrogen hormones. The hormone estrogen produced by the ovaries will stimulate the release of prostaglandins. The high release of prostaglandins will cause severe abdominal cramps in adolescents[12]. Dysmenorrhea is affecting daily activities, and requires analgesics to relieve pain and there are several systemic complaints[12].

Energy is the result of metabolism of nutrients, namely proteins, carbohydrates, and fats. Energy is needed by the body for metabolic growth and for activities. The energy obtained from food must be balanced with the body's needs. The imbalance of energy that enters the body with needs will cause problems if left for a long time. Energy needs in adolescence will increase during menstruation. If this is not properly managed, it will cause an uncomfortable feeling during menstruation[13]. This study did not find any relationship between the level of energy adequacy with the incidence of dysmenorrhea (p = 0.147). This is in line with study Noviyanti *et al* (2018) which obtained p = 0.389, which means that there is no relationship between energy intake and the menstrual

cycle. There is no relationship between the level of energy adequacy and the level of dysmenorrhea because the nutritional status of most respondents is in the normal category, namely 75 people (89.3%) so that there is no negative energy balance. If there is a negative energy balance, then the body weight will be less than the ideal body weight. Lack of energy will cause the body to experience a negative balance. This will result in a decrease in GnRH hormone secretion, so that the LH and FSH hormones also decrease. The decrease in LH and FSH hormones will affect reproductive function[13]. The ovaries in women will not function properly if the body does not produce the right amount of pituitary hormones. Abnormal ovarian function will result in the accumulation of imperfectly formed follicles in the ovaries. The follicle will fail to experience maturation and fail to release an egg. It forms abnormally in the ovaries and results in the formation of endometrial cysts. Endometriosis is endometrial tissue found in the ovaries. During menstruation, the shed endometrial tissue turns and flows into the uterine cavity through the fallopian tubes into the peritoneal cavity and implants on the peritoneal surface. Furthermore, endometrial tissue which in this case is called endometrial tissue, produces estrogen which is then converted into prostaglandins. These prostaglandins trigger contractions in the myometrium which will cause menstrual pain[15].

In addition to energy adequacy, carbohydrate adequacy was also measured in this study. Foods that contain carbohydrates such as rice, noodles, potatoes, bread, corn, and cassava can help relieve symptoms of dysmenorrhea. The level of carbohydrate adequacy that is less or more can affect the level of dysmenorrhea. If a person consumes foods containing carbohydrates less than the body's needs, it will potentially experience dysmenorrhea. This is because carbohydrates are the body's main source of energy which if carbohydrate intake is less than the body's needs will result in several effects such as fatigue, headaches and stomachaches[16]. Carbohydrate intake is closely related to energy because carbohydrates are the body's main energy source. Unbalanced intake of energy and carbohydrates will affect nutritional status and if left unchecked can cause health problems. Health problems such as obesity trigger dysmenorrhea in adolescents[15]. This study did not find a relationship between the level of carbohydrate adequacy with the incidence of dysmenorrhea ($p = 0.178$). This happened because most of the respondents had normal nutritional status, as many as 75 people (89.3%) and 54 people (64.3%) had normal levels of carbohydrate adequacy. This is in line with research Noviyanti *et al*, (2018) which states that there is no relationship between carbohydrate intake and the menstrual cycle. In contrast to the study conducted by Rahmadianta & Adiningsih (2020) using the spearmen test, the results of $p = 0.010$ were obtained, which means that there is a significant relationship between carbohydrate adequacy and the incidence of premenstrual syndrome (PMS).

The results of statistical tests showed $r = -0.039$ which means that there is a weak relationship in a negative direction between the incidence of dysmenorrhea and the frequency of carbohydrate consumption, and $p = 0.726$ which means that there is an insignificant relationship. This study is in line with Damayanti (2021) which uses the chi square test with $p = 0.808$, which means that there is no relationship between the severity of dysmenorrhea and the frequency of eating in adolescent girls at SMK Negeri 2 Lumajang. This can happen because the quality of food will affect the severity of dysmenorrhea more than the quantity of the respondent's food. The severity of dysmenorrhea will be more influenced by the nutritional content contained in the food consumed by the respondent. So, even though the frequency

of food consumption is not frequent, but all the nutrients needed by the body are met, the severity of dysmenorrhea will be low[10].

Caffeine is a type of alkaloid that occurs naturally in foods such as coffee, tea, chocolate and soft drinks[18]. Caffeine contained in these foods and beverages can cause vasoconstriction effects on blood vessels in the uterus. These effects will cause pain during menstruation[18]. In addition, caffeine is a strong central nervous system stimulant. Excessive caffeine consumption can cause excessive stimulation of the hypothalamus which will result in an imbalance in reproductive hormones. The central neurotransmitter adenosine is a purine nucleoside formed by the combination of adenine and D-ribose. Adenosine inhibits central nerve synapses and inhibits glutamate transmission and dopamine release which will result in a decrease in estrogen. Caffeine which acts as an adenosine antagonist reduces the inhibitory effect of adenosine so that there is an increase in the excitation of the central nervous system. Since the central nervous system is responsible for the production of steroid hormones, this inhibitory action of caffeine influences progesterone levels. Lack of the hormone progesterone can trigger pain during menstruation[19]. The results of statistical tests showed the value of r = -0.036 and p = 0.743, which means that there is a weak relationship in the negative direction and is not significant. There is no relationship between the level of dysmenorrhea and the frequency of caffeine consumption because only 7 people (9%) always consume caffeine-sourced foods and beverages. This is in line with research[20]. Always consuming foods and drinks that contain caffeine can cause various side effects such as severe pain during menstruation[16]. However, it is different from research which states that there is an effect of caffeine consumption on adolescent menstrual cycles[21].

CONCLUSION

Based on the research that has been done, it can be concluded that the incidence of dysmenorrhea in most respondents is in the category of moderate dysmenorrhea and the nutritional status of respondents is generally in the normal category. There is a significant relationship between nutritional status and the incidence of dysmenorrhea with a low strength relationship in the positive direction. The incidence of dysmenorrhea based on nutritional status might likely in influenced by high levels of the hormone estrogen. In addition, there is no significant relationship between the level of adequacy of energy and carbohydrates with the incidence of dysmenorrhea in class XI students at SMA Negeri 2 Toraja Utara.

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