The Correlation Between Calcium and Iron Intake with Dysmenorrhea in Female Adolescents in SMA Negeri 1 Ambarawa

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ABSTRACT

Dysmenorrhea is pain in the stomach that comes from uterine cramps and occurs during menstruation. Menstrual pain or dysmenorrhea can have an impact on learning activities in adolescents. The incidence of dysmenorrhea in Central Java reaches 56%. Calcium and iron intake are factors that can affect the incidence of dysmenorrhea. The research objective was to determine the correlation between calcium and iron intake and the incidence of dysmenorrhea in female adolescents at SMA Negeri 1 Ambarawa. This study is a descriptive correlation study with a cross sectional approach. The population was 501 students of SMA Negeri 1 Ambarawa. There were 87 subjects taken by proportional random sampling. Collecting data using UPAT (Universal Pain Assessment Tool) and FFQ (Food Frequency Questionnaire). The data were analyzed using kendals'tau control test (α = 0.05). Research results female adolescent calcium intake is 92.0% less, 6.9% good, and 1.1% more. The iron intake of female adolescent was 96.6% less, 2.3% good, and 1.1% more. The incidence of dysmenorrhea in female adolescent was 44.8% mild pain, 28.7% moderate pain, 8.0% severe pain, 5.7% very severe pain, and 12.6% no pain. There is a correlation between calcium intake and the incidence of dysmenorrhea (p = 0.008). There is a correlation between iron intake and the incidence of dysmenorrhea (p = 0.005).

Keywords : *Calcium intake, iron intake, dysmenorrhea incidence, female adolescents.*

INTRODUCTION

Adolescents are a transitional age from childhood to adulthood. The phenomenon of growth in adolescence demands high nutritional needs. Not meeting nutritional needs at this time can result in delayed sexual maturation and linear barriers (Irianto, 2014). Menstruation is a natural process in a woman's life. Every woman has a different menstrual experience. Some women get menstruation without any complaints, but there are some of them who get menstruation accompanied by complaints, one of which is dysmenorrhea that occurs during menstruation or after menstruation (Baziad, 2008). In the Putri Research (2018) menstrual pain or dysmenorrhea can have an impact on learning activities in adolescents.

The prevalence of dysmenorrhea in women in the world is quite large. Based on data from WHO, the incidence of 1,769,425 people (90%) of women with dysmenorrhea, 10-15% of them experienced severe dysmenorrhea. The incidence of primary dysmenorrhea in each country is reported to be more than 50%.

Longitudinal studies from Sweden reported an incidence of dysmenorrhea of 90% in women aged less than 19 years (Anugroho and Ari, 2011). According to Savitri in Silviani (2019), in Indonesia the incidence of dysmenorrhea consists of 54.89% primary dysmenorrhea and 9.36% secondary dysmenorrhea. Meanwhile, the incidence of dysmenorrhea in Central Java reaches 56% (Fatmawati, et al, 2016). According to Simanjuntak's research (2018) at SMA Negeri 1 Barus, there were 72 students of whom 27 students (37.5%) had mild dysmenorrhea, as many as 25 students (34,7%) had moderate pain, and as many as 20 students (27,8%) had severe pain.

Dysmenorrhea can be divided into two, namely primary dysmenorrhea and secondary dysmenorrhea. Menstrual pain, especially primary dysmenorrhea, is caused by several factors, one of which is nutritional intake. Excess prostaglandins are caused by a lack of micronutrients including vitamins and minerals that trigger dysmenorrhea (Dewantari, et al, 2012).

Calcium is a micronutrient that plays a role in protein interactions in muscle, namely actin and myosin. Lack of calcium in the blood can cause muscles to be unable to relax after contraction, causing the body to stiffen and can lead to seizures (Dysmenorrhea) (Dewantari, et al, 2012). The results of research that are in line with this were carried out by Safitri, et al. (2015) where the p-value of 0,000 means that in this study there is a correlation between calcium intake and dysmenorrhea in XI grade students at SMA Negeri 2 Palu.

In addition to calcium, micronutrients that can reduce dysmenorrhea are iron. Iron is the main component that has an important role in the formation of blood (hemopoiesis), which is to synthesize hemoglobin. One of the functions of hemoglobin is to bind oxygen which is then circulated throughout the body, if the hemoglobin level is less then there is only a small amount of oxygen bound and circulated, so that oxygen cannot be channeled to the blood vessels in the reproductive organs which at that time is experiencing vasoconstriction causing pain (Tjokronegoro, 2004). In Maula's (2017) study, 93% of respondents with a category of insufficient iron intake experienced primary dysmenorrhea. While respondents with sufficient iron intake of 50% experienced primary dysmenorrhea with a p-value of 0,014.

Based on the results of a preliminary study conducted in February (2020), it was found that of the 22 students of SMA Negeri 1 Ambarawa who experienced dysmenorrhea without intervention as many as 10 respondents (45.5%), as many as 5 respondents (22.7%) experienced dysmenorrhea with intervention and as many as 7 respondents (31.8%) did not experience dysmenorrhea. These interventions include compressing the stomach with hot water, taking pain relievers or herbs, and using aromatherapy.

Based on the semiquantitative FFQ intake data from 22 respondents (100%), it was found that the measurement results of calcium intake and iron intake were in the low category, there were no respondents with good or more

categories of calcium and iron intake. All respondents did not consume Fe tablets provided by the government or other Fe supplements. Some of the interviewed respondents did not like eating green vegetable sources, fruit and rarely consumed meat or other animal protein sources and consumed sweetened condensed milk compared to high-calcium milk or other dairy products. So that consumption of iron and calcium sources is still limited. This study aims to determine the correlation between calcium and iron intake with dysmenorrhea in female adolescents in SMA Negeri 1 Ambarawa.

METHODS

The research design used was a descriptive correlation study with a cross-sectional approach, where measurements were made at the same time, both independent and dependent variables (Notoatmodjo, 2018).

The population in this study were all students of class XI and class XII in SMA Negeri 1 Ambarawa, totaling 501 students. The sampling technique in this study was Proportional Random Sampling. The number of samples used as research respondents was 87 subjects.

The inclusion criteria in this study were students of class XI and XII at SMA Negeri 1 Ambarawa aged 14-17 years old and willing to be research subjects. The exclusion criteria in this study were students who did not complete data collection during the study.

The way of collecting data in this research is done online via google form. The explanation of the data collection procedure was explained by the researcher through the WhatsApp group created by the researcher, after which the researcher shared a google form link to fill in the research subject. Data collection for calcium and iron intake used the FFQ (Food Frequency Questionnaire) and the categories used were less (<80%), good (80-100%), more (> 100%). Data were collected for the incidence of dysmenorrhea using UPAT (Universal Pain Assessment Tool) and the categories used were no pain (0), mild pain (1-3), moderate pain (4-6), severe pain (7-9), very severe pain (10).

The correlation between calcium and iron intake and the incidence of dysmenorrhea in female adolescents at SMA Negeri 1 Ambarawa was analyzed using Kendall tau correlation test (α = 0.05).

RESULTS AND DISCUSSION

1. Overview of Calcium Intake

Table 1. Frequency distribution based on calcium intake in female adolescents at SMA Negeri 1 Ambarawa

Calcium intake (mg)	Frequency (n)	Percentage (%)
Less (<80%)	80	92.0
Good (80-100%)	6	6.9
More (> 100%)	1	1,1
Total	87	100

Based on Table 1 shows that there are more respondents with a percentage of calcium intake in the low category (<80% RDA), namely 80 respondents (92.0%), compared to the percentage of calcium intake in the good category of 6 respondents (6.9%), and calcium intake with more categories of 1 respondent (1.1%). This is in line with Maula's Athiyatul research (2017) which shows that most respondents have less calcium intake, which is 84%.

Based on the Adequacy Rate 2019 (RDA), young women aged 13-18 years are encouraged to consume 1200 mg / day of calcium. The large number of respondents who have insufficient calcium intake is because respondents rarely consume food sources of calcium every day. In this study, the food sources of calcium that were often consumed by respondents were tofu, tempeh, chicken liver, long beans, and UHT milk.

Nuts and their preparations such as tofu and tempeh have the largest contribution of calcium because they are more frequently consumed by respondents. Serelia, nuts and their products such as tofu, tempeh, and green vegetables are good sources of calcium too, but these food ingredients contain many substances that inhibit the absorption of calcium such as fiber, phytate and oxalate (Almatsier, 2009). Milk is the best source of calcium, and also processed products such as cheese, ice cream, yogurt (Irianto, 2014). This is supported by the results of research conducted by Febriani et al. (2018) showing that there is a relationship between consumption of cow's milk and a decrease in the intensity of primary dysmenorrhea based on the results of the Pearson correlation test with a significance number of p = 0.000.

2. Overview of Iron Intake

Table 2. Frequency distribution based on iron intake in female adolescents at SMA Negeri 1 Ambarawa

Iron intake (mg)	Frequency (n)	Percentage (%)
Less (<80%)	84	96.6
Good (80-100%)	2	2,3
More (> 100%)	1	1,1
Total	87	100

Based on Table 2, it shows that there are more respondents with a percentage of iron intake in the low category (<80% RDA), namely 84 respondents (96.6%), compared to the percentage of iron intake in the good category of 2 respondents (2.3%), and iron intake with more categories was 1 respondent (1.1%). This is in line with research by Hidayati et al. (2016) which shows that most respondents have less iron intake, namely 71.6%.

Based on the RDA 2019, young women aged 13-18 years old are advised to consume 15 mg / day of iron. The lowest respondents' iron intake was 0.5 mg / day, while the highest iron intake was 27 mg / day. The large number of respondents who have insufficient iron intake is because respondents rarely consume iron sources every day. In this study, food sources of iron that are often consumed by respondents based on the respondent's eating habits are broiler chicken eggs with regular eating frequency (3-6x / week), chicken meat with occasional eating frequency (1-2x / week), and spinach with regular meals. regular meal frequency (3-6x / week). In general, meat, chicken and fish have high biological value, serelia and legumes have moderate biological value, and most vegetables,

Low iron intake can be caused by a chaotic teenage diet. the fear of being fat is one of the factors that causes young women to have bad eating behavior. In women it is known that body dissatisfaction has a correlation with eating behavior. adolescents often eat irregularly, deliberately skipping meals, deliberately vomiting food, consuming excessive snacks, or undergoing special diets (Dieny, 2014).

3. Description of Dysmenorrhea

Table 3. Frequency distribution based on the incidence of dysmenorrhea in female adolescents at SMA Negeri 1 Ambarawa

Dysmenorrhea incident	Frequency (n)	Percentage (%)
No Pain 0	11	12.6
Mild Pain 1-3	39	44.8
Moderate Pain 4-6	25	28.7
Severe Pain 7-9	7	8.0
Very Severe Pain 10	5	5.7
Total	87	100

Based on Table 3, it shows that most of the 87 respondents experienced dysmenorrhea with mild pain as many as 39 respondents (44.8%), moderate pain as many as 25 respondents (28.7%), severe pain as many as 7 respondents (8.0%), pain very heavy as many as 5 respondents (5.7%), and 11 respondents (12.6%) who were not painful. This is in line with the research of Pundati et al. (2016) which showed that of the 85 respondents interviewed, there were 57 (67.1%) respondents who experienced dysmenorrhea with the most classification in the mild dysmenorrhea category, namely 42 (49.4%) respondents. Dysmenorrhea is pain before or during menstruation, this is one of the most common gynecologic problems in young women (Lowdermilk, et al, 2010).

The scale of pain felt by young women in SMA Negeri 1 Ambarawa varies, this is because pain is subjective. The pain intensity felt by each individual will vary. Only the person experiencing pain can explain how much pain you feel. The intensity of menstrual pain (dysmenorrhea) experienced by women varies, from mild to moderate pain to severe pain. Mild pain intensity only causes discomfort and does not interfere with activities. Meanwhile, severe pain is menstrual pain that interferes with activity. Dysmenorrhea with severe pain is most often felt by women on the first to the third day of the menstrual cycle (Dhyana, 2019).

4. The correlation between calcium intake and the incidence of dysmenorrhea in young women at SMA Negeri 1 Ambarawa

Table 4. The correlation between Calcium Intake and Incidence of Dysmenorrhea in female adolescents at SMA Negeri 1 Ambarawa

Calcium intake	Dysmenorrhea incident												*p value*
	No Pain		Mild Pain		Moderate Pain		Severe pain		Very Severe Pain		Total		
	F	%	F	%	F	%	F	%	F	%	F	%	
Less	7	8.8	37	46.2	24	30.0	7	8.8	5	6.2	80	100	
Good	3	50.0	2	33.3	1	16.7	0	0	0	0	6	100	0.008
More	1	100	0	0	0	0	0	0	0	0	1	100	
Total	11	12.6	39	44.8	25	28.7	7	8.0	5	5.7	87	100	

Based on the Kendall tau test, the p value is 0.008 Then p 0.008 <0.05, meaning that there is a relationship between calcium intake and the incidence of dysmenorrhea in young girls at SMA Negeri 1 Ambarawa. The results of this study are in line with research by Cia and Anindita (2020) which states that there is a relationship between calcium intake and dysmenorrhea in adolescents, seen from the Chi-Square test, the p value = 0,000.

The results of the cross tabulation can be seen in Table 4 which shows that 7 respondents (8.8%) had less calcium intake, no pain, 37 respondents (46.2%) mild pain, 24 moderate pain (30.0%), severe pain was 7 respondents (8.8%), and very severe pain was 5 respondents (6.2%). Meanwhile, 3 respondents (50.0%) had good calcium intake, compared with 2 respondents (33.3%) mild pain and 1 respondent (16.7%) moderate pain. Respondents who have more calcium intake as much as 1 respondent (100%) are not pain. Lack of calcium can cause osteoporosis, rickets, disorders of muscle contraction and muscle cramps (Williams, 2007).

Deficiency of micronutrients (vitamins and minerals) encourages excess prostaglandins that can cause

dysmenorrhea, namely pain in the lower abdomen that appears before or during menstruation. Most respondents with less calcium intake had more dysmenorrhea than those with good and more calcium intake categories. This is because calcium is a substance needed in muscle contraction, including muscles in the reproductive organs. When muscles are deficient in calcium, they cannot relax after the contraction that occurs during menstruation, causing the muscles to cramp and cause pain. Increasing daily calcium intake can help reduce stomach cramps during menstruation (Rosvita, et al, 2018).

As many as 7 respondents (8.8%) with less calcium intake did not experience dysmenorrhea and as many as 3 respondents with good calcium intake experienced dysmenorrhea (2 mild pain, 1 moderate pain). This is because in addition to intake factors, there are other factors that can affect dysmenorrhea such as age of menarche, length of menstruation, exercise habits, and family history (Lubis, 2018).

5. The correlation between iron intake and the incidence of dysmenorrhea in young women at SMA Negeri 1 Ambarawa

Table 5. The correlation between iron intake and the incidence of dysmenorrhea in female adolescents at SMA Negeri 1 Ambarawa

Iron intake	Dysmenorrhea incident												*p value*
	No Pain		Mild Pain		Moderate Pain		Severe pain		Very Severe Pain		Total		
	F	%	F	%	F	%	F	%	F	%	F	%	
Less	8	9.5	39	46.4	25	29.8	7	8.3	5	6.0	84	100	
Good	2	100	0	0	0	0	0	0	0	0	2	100	0.005
More	1	100	0	0	0	0	0	0	0	0	1	100	
Total	11	12.6	39	44.8	25	28.7	7	8.0	5	5.7	87	100	

Based on the Kendall tau test, the p value is 0.005. Then p 0.005 <0.05, meaning that there is a relationship between iron intake and the incidence of dysmenorrhea in young women at SMA Negeri 1 Ambarawa. The results of this study are in line with the research of Masruroh and Nur (2019) which states that there is a significant correlation between Fe (iron) intake and the incidence of dysmenorrhea in adolescent girls as seen from the Spearman Rank test which obtained a p-value = 0.014.

The results of cross tabulation can be seen in Table 5, which shows that 8 respondents (9,5%) had less iron intake, no pain, 39 respondents (46.4%) mild pain, 25 respondents with moderate pain. (29.8%), severe pain was 7 respondents (8.3%), and very severe pain was 5 respondents (6.0%). Meanwhile, 2 respondents (100%) had good

iron intake and 1 respondent (100%) had no pain.

According to Varney in Savitri (2019) the main cause of primary dysmenorrhea is the presence of prostaglandin F2a (PGF2a) produced in the endometrium. PGF2a is a hormone needed to stimulate uterine contractions during menstruation. The higher the prostaglandin level, the higher the chance of dysmenorrhea.

Most of the respondents with less iron intake were more likely to experience dysmenorrhea. Lack of iron causes a decrease in plasma iron levels, so that the supply of iron into the bone marrow is reduced. Iron which functions for immunity will reduce pain during menstruation due to disruption of the T lymphocyte immune response and lack of iron intake causes reduced hemoglobin formation which also interferes with the immune response resulting in dysmenorrhea (Hamsari, et al, 2019).

Some respondents who had less iron intake but did not experience dysmenorrhea were 8 respondents (9.5%). According to Sinclair (2010) in Hamsari, et al (2019) this can be caused because physical activity in the form of exercise will reduce prostaglandin levels and release endorphins which will reduce the effects of pain during menstruation so that dysmenorrhea does not occur.

CONCLUSION

There is a correlation between calcium and iron intake and the incidence of dysmenorrhea in female adolescents at SMA Negeri 1 Ambarawa.

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