Analysis of Body Mass Index with Primary Dysmenorrhea Pain Level in Adolescents

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ABSTRACT

Background : *Dysmenorrhea can have significant negative impacts, affecting a woman's quality of life in carrying out daily activities, decreasing work performance, and academic achievement. Several studies have shown an increased risk of menstrual pain in those who are underweight or overweight.* **Methods :** *This research This study used a quantitative descriptive research design with a cross-sectional approach. The population in this study were adolescents in Jember Regency. The sample was taken using purposive sampling. The number of samples obtained was 48 respondents. The statistical test used in the bivariate analysis was chi-square.* ***Result :*** *The results of the study showed that 34 respondents (70.8%) had normal nutritional status and 14 respondents (29.2%) had malnutrition. The level of mild dysmenorrhea pain was 13 respondents (27.1%) and the level of moderate dysmenorrhea pain was 35 respondents (72.9%). The results of the statistical analysis of body mass index with the level of primary dysmenorrhea pain in adolescents with a p-value of 0.046 and an OR value of 7.09****. Conclusion :*** *Women with a high BMI will have a greater chance of experiencing higher pain severity than normal women. Excess fat tissue causes pressure on blood vessels, thereby disrupting blood flow and resulting in pain during menstruation. Women with a low BMI are assumed to have inadequate nutritional intake during the luteal phase of menstruation, thereby worsening pain during menstruation.*

Keywords : *Adolescents, BMI, dysmenorrhea*

Introduction

Adolescence is a transitional period in achieving psychological maturity. During this time, he begins to develop abstract characteristics and his self-concept becomes clearer. Adolescents start to view themselves with individual judgments and criterion, but less so with community comparisons. Adolescence according to the World Health Organization (WHO) is the age period between 10 and 19 years. Every teenager has experienced menstruation, that is the vaginal flow of blood from the shedding of the uterine lining. Menstruation typically occurs every 28 days during the reproductive years, with a normal menstrual cycle lasting 21-42 days. Menstruation will last for 4 to 5 days, during this time the blood comes out around 50 to 60 ml. (1)

Primary dysmenorrhea is a popular gynecological condition by teenage girls during the menstrual cycle. The incidence of dysmenorrhea is quite high, 50% to 90% in adolescents and women of childbearing age worldwide. (2) The incidence of dysmenorrhea in Indonesia reached 64.25%, including primary dysmenorrhea at 54.89%. Dysmenorrhea can have a bad impact, affecting adolescent girls quality of life in carrying out daily routine activities, decreasing proficiency and academic achievement. (3) A study said that dysmenorrhea affects student absences from class by 68.5%. (4)

According to Mariska (2025), there is a strong and statistically significant correlation between BMI and the level of dysmenorrhea pain.(5) Another study conducted by Riham (2026) stated that BMI is one of the factors that has a significant relationship with the level of dysmenorrhea. Body fat levels play an important role in maintaining a regular ovulation cycle, affect the quality

of estrogen produced, and can affect the thickness of the endometrial wall which then also affects the level of dysmenorrhea.[6,7]
Several studies have stated an increased risk of menstrual pain in someone who is underweight or overweight, although there are several studies that state this is not proven. Poor nutritional status due to inadequate intake or over-nutrition status results in excessive fat accumulation which disrupts menstrual blood flow through hyperplasia or compression of blood vessels, which results in worsening dysmenorrhea pain. [5] Nutritional status in adolescents is assessed based on the body mass index (BMI). BMI is an effective measuring tool to identify nutritional status, both undernutrition and overnutrition. [6] Sources of nutrients associated with menstrual pain are calcium and iron. [7]
Every Indonesian citizen has the right to obtain welfare throughout his life. This is stated in the provisions of the 1945 Constitution in paragraph 4 which states that the Indonesian state has a noble goal to advance coomonweal and enlightening the nation's life. The program of providing iron tablets to adolescent girls distributed through schools has demonstrated the government's seriousness in preventing anemia associated with dysmenorrhea. Where the iron requirement for school-age children is 7-14 grams per 100 grams of food products. [8] The phenomenon that occurred based on the results of the study was the existence of several human resource constraints in the form of time and awareness of this program, facilities namely constraints on TTD stock, socialization and distribution, funds are still insufficient and promotion namely the constraint of lack of understanding among adolescents and difficulty in accessing health centers or integrated health posts for follow-up. [9] Therefore, this study aims to analyze body mass index with the level of primary dysmenorrhea pain in adolescents in Jember.

METHODS

This study employed a quantitative descriptive research design with a cross-sectional approach. The aim was to analyze the relationship between body mass index and primary dysmenorrhea pain levels in adolescents. The population in this study were adolescents in Jember Regency. Samples were taken using a purposive sampling method.. The total sample obtained was 48 respondents. This study was conducted on April 28, 2026, in Jember Regency. Univariate data were analyzed to describe the frequency distribution and percentage of each BMI category and the level of dysmenorrhea pain in adolescents. The statistical test used in the bivariate analysis was chi-square.
The inclusion criteria for this study were respondents who had experienced menstruation, were non-smokers, and were willing to participate. Exclusion criteria were respondents who had a history of reproductive organ abnormalities, obesity, alcohol consumption, and stress.

RESULT

After analyzing the BMI calculation and the level of dysmenorrhea pain in adolescents, the following results were obtained:

Table 1. Univariate analysis of Body Mass Index (BMI)

Category	Frequency	Percentage (%)
Normal	34	70.8
Malnutrisi	14	29.2

Table 1 shows that the BMI of adolescents in Jember is mostly normal, with 34 respondents (70.8%) and malnutrition, with 14 respondents (29.2%). Normal BMI is defined as a BMI measurement result of 18.5–25, while malnutrition indicates low or excessive nutritional status, indicated by a BMI result of <18.5 or >25.[10]

Table 2. Univariate analysis of dysmenorrhea pain levels in adolescents

Category	Frequency	Percentage (%)
Ringan	13	27.1
Berat	35	72.9

Table 2 shows that 13 respondents (27.1%) had mild dysmenorrhea pain, while 35 respondents (72.9%) had moderate dysmenorrhea pain. This study used the NRS pain measurement tool. The NRS is the most commonly used pain scale and has a higher sensitivity value. Mild pain is defined as pain that lasts for a few moments, coming and going, and the patient is still able to perform their daily activities. Moderate dysmenorrhea is characterized by pain that begins to intensify, radiating down to the waist and back. The patient can still perform activities but is hampered. [1,6]

Table 3. Analysis of Body Mass Index with Primary Dysmenorrhea Pain Level in Adolescents

		Pain		Total	p value	OR
		Mild	Moderate			
BMI	Normal	12	22	34	0.046	7.09
	Malnutrition	1	13	14		

Table 3 shows the results of a statistical analysis of body mass index and the level of primary dysmenorrhea pain in adolescents, with a p-value of 0.046, indicating a relationship between BMI and the level of dysmenorrhea pain by adolescents. The OR value of 7.09 indicates that adolescents with a normal BMI are seven times more likely to experience mild dysmenorrhea pain compared to malnourished adolescents.

DISCUSSION

The decrease in progesterone levels during the menstrual cycle causes inflammation in the endometrium, causing decay. During menstruation, the uterus contracts to clear menstrual blood. Dysmenorrhea occurs due to the severity of uterine contractions during menstruation. Uterine contractions in women with dysmenorrhea will experience (1) the uterus will contract constantly with higher strength; (2) more frequent contractions, namely 4-5 times in 10 minutes; (3) higher contraction pressure, namely 150-180 mmHg, equivalent to uterine contractions during labor; (4) contractions in women with dysmenorrhea have an irregular rhythm. [11]

The pathology of dysmenorrhea is an increase in the release of prostaglandin E2 (PGE2) and prostaglandin F2α (PGF2α)in the uterus as long as endometrial shedding. Prostaglandins function to increase uterine contractions and vasoconstriction, thereby increasing the sensitivity of pain fibers and causing dysmenorrhea. Based on research, Prostaglandin levels were found more increase levels in women suffering from dysmenorrhea. through endometrial biopsies and menstrual fluid. [12] PGE2 will cause fat accumulation through PGE2 receptors and someone with a high BMI is more sensitive to pain. [13] So it can be concluded that women with a high BMI will have a greater chance of experiencing higher pain severity than normal women.

A study found that excessive sugar consumption is three times more likely to cause dysmenorrhea in women. Foods with high sugar content inhibit the absorption and metabolism of vitamins and minerals in the body. In addition to metabolism, foods with high sugar content also contain prostaglandins which are linked to dysmenorrhea in women. [14] Excess weight and fat tissue also affect the balance of sex hormones, namely estrogen in women. High levels of estrogen and progesterone affect the rate of prostaglandin production. [15] Excess fat tissue can also cause pressure on blood vessels, thereby disrupting blood flow and resulting in pain during menstruation. [16]

In addition to high BMI, dysmenorrhea also occurs in low BMI. Being underweight in women can have an impact on the reproductive organs, including decreased reproductive function and hypothalamic dysfunction. If gonadotropin levels decrease due to hypothalamic dysfunction, FSH, estrogen, and progesterone production will also decrease. Low progesterone levels trigger prostaglandin production, resulting in increased uterine contractions and dysmenorrhea during menstruation. (7)

In women with low BMI it is assumed that they have inadequate nutritional intake during the luteal phase of menstruation, resulting in decreased immunity and weak physical condition. This is related to the body's ability to suppress pain, the weaker the body's immunity, the less ability to suppress pain, worsening pain during menstruation. (16) Low calorie intake, body weight and fat affect the release of pulsatile pituitary gonadotropins, which is related to increased menstrual pain. Women with low BMI experience increased severity of menstrual pain in primary dysmenorrhea. (17) Deficiencies in essential nutrients such as vitamin D, omega-3 and magnesium can cause increased production of prostaglandins and cause menstrual pain. (18,19) Poor food quality affects inflammatory and endocrine disorders that worsen pain during menstruation. (23)

Poor eating habits in a person that occur over a long period of time can affect a person's nutritional status. (24) Improved nutritional intake has been proven to reduce the level of pain in dysmenorrhea. A diet with anti-inflammatory nutritional intake is said to have the potential to be therapeutic for women with dysmenorrhea. (23) Vitamin intake also needs to be considered in the diet. Vitamins D, B1, E and C can relieve dysmenorrhea. Vitamin intake is believed to limit the production of arachidonic acid which will turn into prostaglandins. Vitamin E can be a source of anti-inflammatory, vitamin C is used as an antioxidant through the conversion of vitamin E back into vitamin E. (25)

This study also has limitations. First, the pain scale was assessed subjectively, not directly measured based on a pain scale because the study subjects tended to be healthy at the time of the assessment. Second, the cross-sectional study design cannot determine absolute causality. Third, the pathological causes of dysmenorrhea (endometriosis, etc.) were not directly examined. Finally, the use of medications that influence the severity of dysmenorrhea among the study subjects was not recorded in the data.

CONCLUSION

Based on research conducted to analyze the relationship between body mass index and primary dysmenorrhea pain levels in adolescents, it can be concluded that adolescents with a normal body mass index experience mild dysmenorrhea pain, while malnourished adolescents (BMI <18.5 or >25) are more susceptible to experiencing more severe dysmenorrhea. There was a significant relationship between BMI and dysmenorrhea pain levels in adolescents.

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