

Original Article

Association Between Nutritional Status and Primary Dysmenorrhea Among Adolescent Girls: A Cross-Sectional Study in Indonesia

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Abstract

Background: Primary dysmenorrhea is a common menstrual health problem among adolescent girls and may interfere with daily activities and school participation. Nutritional status has been proposed as a modifiable factor associated with menstrual symptoms; however, evidence regarding its relationship with the severity of primary dysmenorrhea among adolescents remains limited.

Aims: To determine the association between nutritional status and the severity of primary dysmenorrhea among adolescent girls at MA Nuris, Jember, Indonesia.

Methods: This study employed a descriptive correlational design with a cross-sectional approach. The population comprised 79 female students in Grade XI at MA Nuris, with 44 participants selected using purposive sampling based on the Slovin formula. Nutritional status was assessed through body weight and height measurements to determine body mass index, while dysmenorrhea severity was assessed using the Numeric Rating Scale. Data were analysed using frequency distributions and the Spearman correlation test.

Results: Most participants had normal nutritional status (28, 63.3%), followed by overweight (9, 20.4%) and underweight (7, 16.3%). Regarding dysmenorrhea severity, 26 participants (59.0%) experienced mild symptoms, 13 (29.6%) moderate symptoms, and 5 (11.4%) severe symptoms. Nutritional status was significantly associated with the severity of primary dysmenorrhea ($p < 0.001$).

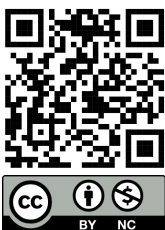
Conclusion: Nutritional status was significantly associated with the severity of primary dysmenorrhea among adolescent girls at MA Nuris. These findings support the importance of promoting balanced nutrition as part of adolescent menstrual health education and reproductive health programmes.

Keywords: adolescents; primary dysmenorrhea; nutritional status; menstrual health; reproductive health

1. Introduction

Adolescents with dysmenorrhea often experience pain during menstruation. Dysmenorrhea consists of complex symptoms in the form of lower abdominal cramps that radiate to the back. Dysmenorrhea can be classified into two types, namely primary dysmenorrhea and secondary dysmenorrhea (Hidayatunnafiah et al., 2022). Primary dysmenorrhea is dysmenorrhea that begins at menarche and is not caused by abnormalities of the reproductive organs or other organs that can interfere with the activities of adolescents, while secondary dysmenorrhea usually occurs after menarche and is caused by endometriosis, fibroids, IUD (Intrauterine Device), tumors in the fallopian tubes, uterine polyps, and others. Adolescents often experience lower abdominal pain during menstruation, causing mood swings that prevent them from carrying out their activities, especially at school, where it can interfere with their concentration (Purnamasari et al., 2020).

According to the World Health Organization (WHO), 10-15% of women experience severe dysmenorrhea, with 2,799,425 women (90%) experiencing dysmenorrhea (Itani et al., 2022). In Indonesia, the number of women with dysmenorrhea is 207,671 (74.24%), consisting of 49,691 (64.99%) with primary dysmenorrhea and 9,496 (9.36%) with secondary dysmenorrhea (info sehat, 2022). In East Java, the number of reproductive-age adolescent girls aged 10-24 years



experiencing dysmenorrhea was 58,895, with 10,565 (1.29%) visiting the obstetrics department (East Java Health Office, 2022). Based on data from the highest number of menstrual disorders among schoolgirls aged 10-14 years, totaling 1,457 cases, the Sumber Sari area ranked first with 740 cases, followed by Ledokombo with 122 cases, Tanggul with 116 cases, Sumberbaru with 109 cases, and Ajung with 63 cases (Chakra, 2023).

Primary dysmenorrhea occurs due to abnormal nutritional status, underweight, or being overweight. Nutritional problems with dysmenorrhea are one of the risk factors for primary dysmenorrhea (Purnamasari et al., 2020). Low nutritional status (underweight) can be caused by insufficient food intake, including iron, which can lead to anemia. Anemia is one of the factors that causes a lack of resistance to pain, so that primary dysmenorrhea can occur during menstruation. While overweight can also cause dysmenorrhea due to excessive fatty tissue, which can lead to hyperplasia of blood vessels or compression of blood vessels by fatty tissue in the female reproductive organs, thereby disrupting the flow of blood during menstruation and causing menstrual pain (Oktaviani, 2024).

The nutritional status of adolescent girls has a significant impact on the symptoms experienced during menstruation. Nutrient deficiencies such as vitamin E, calcium, and magnesium can exacerbate premenstrual syndrome symptoms, which in turn can worsen menstrual pain or dysmenorrhea (Sartika & Nurmawati, 2023). Consuming a balanced diet is an effective way to overcome menstrual pain. Adolescent girls who are malnourished will experience impaired sexual maturation, growth, organ function, and reproductive function. During menstruation, adolescent girls need a balanced diet because nutritional requirements increase during the luteal phase (Oktaviani, 2024). Failure to pay attention to this will result in complaints and discomfort during the menstrual cycle. The nutritional status of adolescents affects the occurrence of complaints during menstruation and the duration of menstruation. However, there are some adolescents who do not experience any complaints during menstruation. This is due to adequate nutrition and regular exercise. Therefore, one of the risk factors for adolescent girls experiencing dysmenorrhea is their nutritional status (Desbrow, 2021).

Reproductive health education programs organized by the government often include information about the importance of proper nutrition to reduce the risk of dysmenorrhea. In addition, the government can also provide support to public health facilities, such as community health centers or youth health clinics, to provide nutritional counseling services to adolescents who experience nutritional problems that can affect dysmenorrhea. Furthermore, the government can also promote policies that support access to nutritious food for the community, including adolescents. This can be done through food assistance programs, nutritious food subsidies, or pricing policies that encourage the community to choose healthy foods. The government can also collaborate with non-governmental organizations and the private sector to improve the accessibility and availability of nutritious food, especially for families with economic limitations. With the above data, researchers will analyze the relationship between nutritional status and the occurrence of dysmenorrhea in adolescent girls.

2. Methods

2.1 Study Design

This study employed a descriptive correlational design with a cross-sectional approach to examine the association between nutritional status and the severity of primary dysmenorrhea among adolescent girls. Height and body weight were measured to assess nutritional status, while dysmenorrhea severity was assessed using the Numeric Rating Scale (NRS).

2.2 Study Setting

The study was conducted at MA Nuris, Jember, Indonesia, in May 2024.

2.3 Participants and Sampling

The study population comprised 79 female students in Grade XI at MA Nuris. A total of 44 participants were selected using purposive sampling, based on predefined eligibility criteria.

The inclusion criteria were adolescent girls who had experienced menarche, experienced primary dysmenorrhea without a known history of reproductive disease, and were not experiencing an acute illness that could affect the measurement results. The exclusion criteria were adolescents with secondary dysmenorrhea, including those diagnosed with endometriosis, ovarian cysts, or uterine myoma, and those regularly taking medications that could affect menstrual pain, such as analgesics or hormonal therapy.

2.4 Data Collection

Nutritional status was assessed through direct measurement of body weight and height, which were used to calculate body mass index (BMI). The severity of dysmenorrhea was assessed using the Numeric Rating Scale (NRS). The manuscript states that the instrument used to assess pain had undergone validity and reliability testing.

2.5 Data Analysis

Data were analysed using univariate and bivariate analyses. Univariate analysis was used to describe the distribution of participants according to nutritional status and dysmenorrhea severity. The Spearman correlation test was used for bivariate analysis to examine the association between nutritional status and dysmenorrhea severity. Statistical significance was determined at $p < 0.05$.

2.6 Ethical Considerations

Ethical approval for this study was obtained under reference number 488/KEPK/UDS/VII/2024. Participants provided consent with the involvement of their parents or legal guardians. The researchers maintained the confidentiality of participant data throughout the study.

3. Results

Results should be clear and concise. Tables and figures are preferred.

3.1 Participant Characteristics

The characteristics of the 44 participants are presented in Table 1. Most participants were aged 16–17 years (34, 77.3%), while 10 (22.7%) were younger than 16 years. Regarding age at menarche, 33 participants (75.0%) reported menarche at age ≥ 12 years, while 11 (25.0%) reported menarche before 12 years.

Table 1. Participant Characteristics

Characteristic	n	%
Age		
<16 years	10	22.7
16–17 years	34	77.3
Age at menarche		
<12 years	11	25.0
≥ 12 years	33	75.0
Total	44	100.0

3.2 Nutritional Status

The distribution of nutritional status is presented in Table 2. Most participants had normal nutritional status (28, 63.3%), followed by overweight (9, 20.4%) and underweight (7, 16.3%).

Table 2. Distribution of Nutritional Status

Nutritional Status	n	%
Overweight	9	20.4
Normal	28	63.3
Underweight	7	16.3
Total	44	100.0

3.3 Severity of Primary Dysmenorrhea

The distribution of primary dysmenorrhea severity is presented in Table 3. Most participants experienced mild dysmenorrhea (26, 59.0%), followed by moderate dysmenorrhea (13, 29.6%) and severe dysmenorrhea (5, 11.4%).

Table 3. Distribution of Nutritional Status

Dysmenorrhea Severity	n	%
Mild	26	59.0
Moderate	13	29.6
Severe	5	11.4
Total	44	100.0

3.4 Association Between Nutritional Status and Primary Dysmenorrhea

The distribution of primary dysmenorrhea severity across nutritional status categories is presented in Table 4. Among participants with normal nutritional status, 24 (54.3%) experienced mild dysmenorrhea, while 4 (9.0%) experienced moderate dysmenorrhea and none experienced severe dysmenorrhea. Among overweight participants, 4 (9.0%) experienced moderate dysmenorrhea and 5 (11.4%) experienced severe dysmenorrhea, with no participants reporting mild dysmenorrhea. Among underweight participants, 3 (7.3%) experienced moderate dysmenorrhea and 4 (9.0%) experienced severe dysmenorrhea, while none experienced mild dysmenorrhea.

The analysis demonstrated a statistically significant association between nutritional status and the severity of primary dysmenorrhea ($p < 0.001$).

Table 3. Association Between Nutritional Status and Primary Dysmenorrhea Severity

Nutritional Status	Mild, n (%)	Moderate, n (%)	Severe, n (%)	p-value
Overweight	0 (0.0)	4 (9.0)	5 (11.4)	<0.001
Normal	24 (54.3)	4 (9.0)	0 (0.0)	
Underweight	0 (0.0)	3 (7.3)	4 (9.0)	
Total	24 (54.5)	11 (25.0)	9 (20.5)	

4. Discussion

4.1 Nutritional Status

Based on the results of the study, it was found that the nutritional status of adolescent girls at the Nuril Islam Islamic Boarding School was on average normal, with a result of 28 (63.3%). The normal nutritional status of adolescent girls was determined through body mass index measurements taken using a questionnaire at the time of data collection. The normal nutritional status of adolescents was due to annual nutritional monitoring by UKS officers, which included measuring height and weighing body weight every six months, as well as a healthy diet and extracurricular activities provided at the school, such as athletics, basketball, dancing, and other sports once a week.

This is in line with the theory proposed (Mastorci et al., 2024), which states that adolescence is a transitional period from childhood to adulthood. This is a strategic period because it gives adolescents time to form a lifestyle and determine behavior patterns, values, and traits that are in line with their desires. A balanced diet is food consumed by an individual in a day that is varied and contains energy, building substances, and regulating substances in accordance with the body's needs. The energy and nutritional needs of adolescents and adults are influenced by reproductive age, activity level, and nutritional status (Kolarš et al., 2025). By consuming sufficient calories and protein, physical growth and weight and height gain can be achieved properly. Similarly, adolescent girls with many extracurricular activities and nutritional status monitoring by the school are taught early on the importance of a healthy lifestyle, and most adolescents have normal nutritional status (Inzaghi et al., 2022).

Nutritional status in this study was determined through anthropometric measurements, namely weight and height, to calculate body mass index (BMI) according to age in accordance with the

Ministry of Health's z-score table (Bhattacharya et al., 2019). Based on the observations, adolescents with a height of more than 155 cm tended to have a weight below 50 kg, thus potentially falling into the category of malnutrition, while adolescents with a height of less than 155 cm tended to have a weight above 50 kg. This means that almost half of adolescents have abnormal nutritional status. In addition, based on the results of interviews conducted, the average respondents who have malnutrition are caused by high physical activity and having a family who are also thin (RI, 2024). In addition, they also have a habit of participating in various extracurricular activities, school activities, and often go on trips or what they often refer to as healing. Individuals with high nutritional status also tend to have overweight families, especially their mothers, who have been overweight since childhood and pay little attention to the types of food they consume (Ser et al., 2022).

Global Executive Technology Nutritional status is an assessment of the body based on the energy intake from food and the energy expenditure through activity. Individuals with abnormal nutritional status tend to experience an imbalance between energy intake and expenditure. Individuals with low nutritional status experience an energy imbalance, where energy expenditure is greater than energy intake, and vice versa for individuals with higher nutritional status, where energy intake is greater than energy expenditure, resulting in fat accumulation (Jehan et al., 2020). In addition to physical activity, there are various other factors that influence nutritional status. Nutritional status can be influenced by various factors, which are divided into direct and indirect factors. Direct factors that influence nutritional status include inadequate nutritional intake and infectious diseases (Kiani et al., 2022).

Researchers assume that adolescent girls' diets, including nutritional intake such as calcium, magnesium, and vitamin D, can affect the incidence of primary dysmenorrhea. For example, calcium deficiency can affect uterine muscle contractions and pain intensity. Inadequate nutritional intake, poor nutritional status, or specific nutritional deficiencies may increase susceptibility to primary dysmenorrhea, given the role of nutrition in hormonal regulation and bodily functions. The body weight of adolescent girls can affect their reproductive hormones, which in turn can influence the occurrence of dysmenorrhea. For example, adolescent girls with low or high body mass index may have different risks for dysmenorrhea.

4.2 Dysmenorrhea

Based on the results of the study, it was found that primary dysmenorrhea in adolescent girls at MA Nuris experienced mild dysmenorrhea on average 26 (59%). The mild dysmenorrhea experienced by adolescent girls can be seen from the low pain scale chosen by each adolescent girl on the questionnaire sheet, namely a pain scale of 1-4 for mild dysmenorrhea at the time of data collection. Their normal nutritional status influences mild dysmenorrhea experienced by adolescent girls. Adequate nutrition, especially iron and vitamins, can affect the menstrual cycle and cause dysmenorrhea to become milder. Athletic or very intense physical activity can affect hormone production and change menstrual patterns, including causing dysmenorrhea to become milder.

The causes of primary dysmenorrhea can vary, including exercise, age at menarche, and duration of menstruation (Rani et al., 2024). In addition to these factors, dysmenorrhea is also one of the most influential factors on premature menarche, where the reproductive organs have not developed fully, and there is still narrowing of the cervix, causing pain during menstruation. The reproductive organs have not developed fully, and there is still narrowing of the cervix, causing pain during menstruation (Poli-neto & Reid-mccann, 2025). Women who are an early age of menarche and are at risk should pay attention to their health, especially regarding the occurrence of dysmenorrhea. Risk factors associated with primary dysmenorrhea include age at first menstruation less than 12 years (early menarche), lack of or no exercise, prolonged menstrual cycle or longer than normal menstruation (7 days), alcohol consumption, stress, a positive family history, and smoking. Never having been pregnant or given birth, a family history of menstrual pain, and nutritional status (Lee et al., 2022).

Researchers believe that certain nutritional deficiencies, such as calcium, magnesium, and vitamin D, may contribute to the occurrence of dysmenorrhea in adolescent girls. For example, calcium and magnesium are necessary for regulating uterine muscle contractions, while vitamin

D can affect the menstrual cycle and pain sensitivity. The influence of weight in adolescent girls can affect their reproductive hormones, which in turn can affect the intensity of dysmenorrhea. Adolescent girls with low or high body mass index may have different risks for dysmenorrhea. An unbalanced diet, including high intake of saturated fats or processed foods, can increase inflammation levels in the body, which can worsen dysmenorrhea symptoms. The Role of Hormones Hormonal disorders, such as prostaglandin or estrogen imbalances, can be factors that contribute to dysmenorrhea. Proper nutrition can affect the regulation of these hormones.

4.3 Correlation of Nutritional Status And Primary Dysmenorrhea

The results of the study show that the nutritional status of adolescent girls is normal and the dysmenorrhea they experience is mild. Nutritional status is an expression of balance in certain variables or a manifestation of nurture in certain variables. The energy and nutritional needs of adolescents and adults are influenced by reproductive age, activity level, and nutritional status. If a person's nutritional status is good, there will be no obstacles in their reproductive system. If nutritional needs are not met, there is a risk of deficiency, one of which is a menstrual disorder called dysmenorrhea.

During adolescence, nutritional requirements increase due to rapid physical growth, hormonal changes, and the maturation of the reproductive system. Adequate nutritional intake supports hormonal balance and optimal reproductive function. Adolescents with normal nutritional status tend to have more stable estrogen and progesterone levels, which may regulate prostaglandin production and uterine contractions, thereby reducing the intensity of menstrual pain (Mashhadi et al., 2025).

From the researcher's perspective, it is assumed that the predominance of normal nutritional status among the respondents played a protective role against severe dysmenorrhea. The researcher assumes that sufficient intake of energy, macronutrients, and key micronutrients such as iron, magnesium, and essential fatty acids helps maintain neuromuscular function and pain modulation during menstruation (Savarino et al., 2021). This condition may explain why most participants reported only mild dysmenorrhea symptoms.

Conversely, inadequate nutritional intake can disrupt endocrine function and increase prostaglandin synthesis, which may intensify uterine contractions and menstrual pain (Sumantri & Kurnia Sari, 2023). Previous studies have shown that undernutrition and micronutrient deficiencies are associated with a higher risk of moderate to severe dysmenorrhea (Handayani et al., 2022). However, such conditions were less evident in this study population, further supporting the assumption that good nutritional status contributes to milder menstrual symptoms.

The findings of this study are consistent with earlier research demonstrating that adolescent girls with normal nutritional status are less likely to experience severe dysmenorrhea compared to those with poor nutritional status. Therefore, the researcher assumes that maintaining optimal nutritional status during adolescence is a crucial preventive strategy to minimize menstrual disorders and promote reproductive health.

5. Conclusion

This study found that most adolescent girls had normal nutritional status and experienced mild primary dysmenorrhea. Nutritional status was significantly associated with the severity of primary dysmenorrhea, suggesting that nutritional status is an important consideration in adolescent menstrual and reproductive health. However, the cross-sectional design limits causal interpretation. Promoting balanced nutrition through adolescent health education may support menstrual health, while further longitudinal or interventional research is needed to clarify the relationship and explore other contributing factors such as dietary patterns, physical activity, and psychosocial conditions.

Competing interests

All the authors declare that there are no conflicts of interest.

Underlying data

Derived data supporting the findings of this study are available from the corresponding author on request.

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