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# THE RELATIONSHIP BETWEEN BODY MASS INDEX AND DEGREE OF DYSMENORRHEA AMONG ADOLESCENT GIRLS AT SMAN 8 GOWA IN 2025

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## ABSTRACT

**Background:** Dysmenorrhea is menstrual pain commonly experienced by adolescent girls and may interfere with learning activities, concentration, and quality of life. This study aimed to analyze the relationship between body mass index (BMI) and the degree of dysmenorrhea among adolescent girls at SMAN 8 Gowa.
**Methods:** This observational analytic study used a *cross-sectional* design and was conducted from October to November 2025. A total of 301 female students aged 15-19 years were selected by *purposive sampling* from 647 students after meeting the inclusion and exclusion criteria. BMI was calculated from measured weight and height, while dysmenorrhea severity was assessed using the *Visual Analog Scale* (VAS). Data were analyzed using the *Chi-square* test with SPSS version 29.
**Results:** Most respondents were *underweight* (44.9%). The most common degree of dysmenorrhea was moderate (41.5%), followed by severe (36.9%) and mild (21.6%). Severe dysmenorrhea was most frequent among *underweight* respondents (45.2%). The *Chi-square* test showed a significant association between BMI and dysmenorrhea severity (p=0.021).
**Conclusion:** Body mass index was significantly associated with the degree of dysmenorrhea among adolescent girls at SMAN 8 Gowa; *underweight* adolescents tended to experience more severe dysmenorrhea.

**Keywords :** body mass index, dysmenorrhea, adolescent girls

## INTRODUCTION

Adolescence is an important transitional period from childhood to adulthood, characterized by biological, psychological, and social changes. In adolescent girls, one of the main biological changes is the onset of menstruation. Menstruation is often accompanied by dysmenorrhea, namely pain that occurs before or during menstruation and may be accompanied by systemic symptoms such as nausea, vomiting, diarrhea, dizziness, and fatigue[1]. Dysmenorrhea not only causes physical complaints but may also interfere with learning activities, school attendance, concentration, daily quality of life, and psychosocial well-being among adolescent girls[2].
Globally, approximately 90% of women have experienced dysmenorrhea, and 10-16% experience severe pain that interferes with daily activities[3]. In Indonesia, the prevalence of dysmenorrhea remains high at approximately 64.25%, with primary dysmenorrhea being the most common type[4]. In South Sulawesi, the 2018 Provincial Health Profile reported that dysmenorrhea was also common, with mild pain at 57.7%, moderate pain at 38.5%, and severe pain at 3.8%[5]. These data indicate that dysmenorrhea remains a relevant adolescent reproductive health issue requiring attention, particularly in the school environment.

One factor that plays a role in the occurrence and severity of dysmenorrhea is nutritional status, which is generally assessed using body mass index (BMI). BMI imbalance, both *underweight* and *overweight*, may affect reproductive hormonal balance and increase prostaglandin production, thereby triggering uterine contractions and menstrual pain[1,6]. In adolescent girls, an inadequate nutritional status may also interfere with reproductive system maturation and increase vulnerability to menstrual complaints.

Previous studies on the relationship between BMI and dysmenorrhea have not shown fully consistent findings. Several studies reported that low BMI was associated with

more severe dysmenorrhea, whereas other studies found no significant relationship. These differences may be influenced by variations in population characteristics, nutritional status, lifestyle, pain measurement methods, and local context. Therefore, further research in different adolescent populations is still needed to strengthen the evidence regarding the relationship between BMI and the degree of dysmenorrhea.

Based on this background, this study aimed to analyze the relationship between body mass index and the degree of dysmenorrhea among adolescent girls at SMAN 8 Gowa. The findings are expected to provide information for schools, health workers, and adolescent girls regarding the importance of nutritional status in relation to menstrual pain and to serve as a basis for health education and further research.

## MATERIALS AND METHODS

This study was a quantitative study with an observational analytic design using a *cross-sectional* approach to assess the relationship between BMI and the degree of dysmenorrhea among adolescent girls. The research protocol was approved by the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, Universitas Islam Negeri Alauddin, with ethical approval number 117/KEPK/FKIK/X/2025.

The study was conducted from October to November 2025 at SMA Negeri 8 Gowa. The study population consisted of all female students of SMAN 8 Gowa in 2025 listed in the school registry, totaling 647 students. The sampling process began with screening the population according to the inclusion and exclusion criteria. Respondents who met the criteria were then selected using a *purposive sampling* technique. The sample size was calculated using the Slovin formula with a 5% margin of error from the total population of 647 female students, resulting in a minimum sample size of 247 respondents. In implementation, this study involved 301 respondents to strengthen the analysis and anticipate incomplete data. The inclusion criteria were female students aged 15-19 years who had experienced menstruation and were willing to participate. The exclusion criteria were respondents with a history of gynecological disease, hormonal medication use, or medical conditions that could affect the menstrual cycle and menstrual pain.

Body mass index was determined based on weight and height measurements using standard measuring instruments. Body weight was measured in kilograms and height in meters; BMI was then calculated in $kg/m^2$. BMI values were classified according to the criteria of the Indonesian Ministry of Health into *underweight*, normal, and *overweight* categories. The degree of dysmenorrhea was assessed using the *Visual Analog Scale* (VAS) with a scale of 0-10 and was classified into mild, moderate, and severe categories based on the predetermined score ranges.

The data used in this study were primary data obtained through anthropometric measurements and respondent-completed questionnaires. Before analysis, the data were checked for completeness, coded, and entered into statistical software. Univariate analysis was used to describe respondent characteristics, while the relationship between BMI and the degree of dysmenorrhea was analyzed using the *Chi-square* test as bivariate analysis with the assistance of SPSS version 29. A p-value of <0.05 was considered statistically significant.

## RESULTS

This study involved 301 adolescent girls at SMAN 8 Gowa. The demographic characteristics of respondents are presented in Table 1. A total of 127 respondents (42.2%) were from grade 11. The most common age was 16 years, with a median of 16 (16-17) years. A total of 103 respondents (34.2%) were first-born children. Most respondents came from complete families, totaling 249 respondents (82.7%), and lived with their parents, totaling 237 respondents (78.7%).

**Table 1. Demographic Characteristics of Respondents**

| Characteristic | n | % | Dysmenorrhea Degree | | | *p* |
|---|---|---|---|---|---|---|
| | | | Mild | Mod. | Sev. | |
| **Grade** | | | | | | |
| Grade 10 | 56 | 18.6 | 11 | 23 | 22 | |
| Grade 11 | 127 | 42.2 | 23 | 54 | 50 | 0.58 |
| Grade 12 | 118 | 39.2 | 65 | 125 | 111 | |
| **Age** | | | | | | |
| 15 years | 59 | 19.6 | 8 | 28 | 23 | |
| 16 years | 132 | 43.9 | 32 | 51 | 49 | 0.15 |
| 17 years | 100 | 33.2 | 23 | 45 | 32 | |
| 18 years | 10 | 3.3 | 2 | 1 | 7 | |
| **Birth Order** | | | | | | |
| Only child | 3 | 1.0 | 0 | 2 | 1 | 0.56 |

| | | | | | | |
|---|---|---|---|---|---|---|
| First child | 103 | 34.2 | 22 | 44 | 37 | |
| Middle child | 96 | 31.9 | 25 | 41 | 30 | |
| Youngest child | 99 | 32.9 | 18 | 38 | 43 | |
| **Family Status** | | | | | | |
| Incomplete | 52 | 17.3 | 9 | 22 | 21 | 0.68 |
| Complete | 249 | 82.7 | 56 | 103 | 90 | |
| **Living With** | | | | | | |
| Parents | 237 | 78.7 | 51 | 98 | 88 | 0.98 |
| Other relatives | 64 | 21.3 | 14 | 27 | 23 | |
| **Ethnicity** | | | | | | |
| Bugis | 48 | 15.9 | 10 | 25 | 13 | |
| Makassar | 233 | 77.4 | 49 | 98 | 86 | 0.02 |
| Javanese | 14 | 4.7 | 3 | 1 | 10 | |
| Toraja | 6 | 2.0 | 3 | 1 | 2 | |
| **Father's Education** | | | | | | |
| Elementary/equiv. | 51 | 16.9 | 19 | 22 | 15 | |
| JHS/equiv. | 54 | 17.9 | 6 | 27 | 21 | 0.24 |
| SHS/equiv. | 153 | 50.8 | 32 | 60 | 61 | |
| Bachelor/equiv. | 43 | 14.3 | 13 | 16 | 14 | |
| **Mother's Education** | | | | | | |
| Elementary/equiv. | 54 | 17.9 | 15 | 24 | 15 | |
| JHS/equiv. | 61 | 20.3 | 12 | 28 | 21 | 0.26 |
| SHS/equiv. | 136 | 45.2 | 24 | 52 | 60 | |
| Bachelor/equiv. | 50 | 16.6 | 14 | 21 | 15 | |
| **Income** | | | | | | |
| <IDR 2,000,000 | 140 | 46.5 | 32 | 57 | 51 | |
| IDR 2,000,000-5,000,000 | 103 | 34.2 | 23 | 44 | 36 | 0.90 |
| IDR 5,000,000-10,000,000 | 50 | 16.6 | 8 | 22 | 20 | |
| >IDR 10,000,000 | 8 | 2.7 | 2 | 2 | 4 | |
| **Total** | 301 | 100 | 65 | 125 | 111 | |

**Source: Primary data, 2025**

Based on ethnicity, most respondents were Makassar, totaling 233 respondents (77.4%). The most common parental educational level was senior high school or equivalent, namely 153 respondents (50.8%) for fathers and 136 respondents (45.2%) for mothers. The most common family income was <IDR 2,000,000 per month, reported by 140 respondents (46.5%).

The clinical and reproductive characteristics of respondents are presented in Table 2. Based on BMI, 135 respondents (44.9%) were categorized as *underweight*. The most common age at menarche was 12 years, reported by 116 respondents, with a median of 12 (12-13) years.

Most respondents had a normal menstrual cycle (21-35 days), totaling 156 respondents (51.8%), and a menstrual duration of 7 days, totaling 162 respondents (53.8%). The most frequently reported duration of menstrual pain was 2 days, totaling 178 respondents (59.1%). A total of 263 respondents (87.4%) did not take analgesics, and 214 respondents (71.1%) did not miss school due to dysmenorrhea. A total of 233 respondents (77.4%) reported that dysmenorrhea affected learning concentration, with the most frequently used coping mechanism being distraction, reported by 178 respondents (59.1%).

**Table 2. Clinical and Reproductive Characteristics of Respondents**

| Characteristics | Dysmenorrhea Degree | | | | | | Total |
|---|---|---|---|---|---|---|---|
| | Mild (n=65) | | Mod. (n=125) | | Sev. (n=111) | | |
| | n | % | n | % | n | % | |
| **BMI** | | | | | | | |
| *Underweight* | 19 | 14.1 | 55 | 40.7 | 61 | 45.2 | 135 |
| Normal | 29 | 29.6 | 40 | 40.8 | 29 | 29.6 | 98 |
| *Overweight* | 17 | 25.0 | 30 | 28.2 | 21 | 25.1 | 68 |
| **Age at Menarche** | | | | | | | |
| 10 years | 1 | 25 | 0 | 0 | 3 | 75 | 4 |
| 11 years | 13 | 34.2 | 18 | 47.4 | 7 | 18.4 | 38 |
| 12 years | 21 | 18.1 | 49 | 42.2 | 46 | 39.7 | 116 |
| 13 years | 23 | 22.5 | 42 | 41.2 | 37 | 36.3 | 102 |
| 14 years | 5 | 15.6 | 12 | 37.5 | 15 | 46.9 | 32 |
| 15 years | 2 | 22.2 | 4 | 44.4 | 3 | 33.3 | 9 |
| **Menstrual Cycle** | | | | | | | |
| <21 days | 28 | 22.6 | 51 | 41.1 | 45 | 36.3 | 124 |
| 21-35 days | 35 | 22.4 | 66 | 42.3 | 55 | 35.3 | 156 |
| >35 days | 2 | 9.5 | 8 | 38.1 | 11 | 52.4 | 21 |
| **Menstrual Duration** | | | | | | | |
| <7 days | 22 | 20.4 | 44 | 40.7 | 42 | 38.9 | 108 |
| 7 days | 40 | 24.7 | 67 | 41.4 | 55 | 34 | 162 |
| >7 days | 3 | 9.7 | 14 | 45.2 | 14 | 45.2 | 31 |
| **Pain Duration** | | | | | | | |
| 1 day | 30 | 45.5 | 21 | 31.8 | 15 | 22.7 | 66 |
| 2 days | 30 | 16.9 | 84 | 47.2 | 64 | 36 | 178 |
| ≥3 days | 5 | 8.8 | 20 | 35.1 | 32 | 56.1 | 57 |
| **Analgesic Use** | | | | | | | |
| No | 61 | 23.2 | 116 | 44.1 | 86 | 32.7 | 263 |
| Yes | 4 | 10.5 | 9 | 23.7 | 25 | 65.8 | 38 |
| **School Absence** | | | | | | | |
| No | 49 | 22.9 | 93 | 43.5 | 72 | 33.6 | 214 |
| Yes | 16 | 18.4 | 32 | 36.8 | 39 | 44.8 | 87 |
| **Absence Frequency** | | | | | | | |
| Never absent | 49 | 21.9 | 93 | 43.8 | 72 | 34.3 | 214 |
| 1-2 times | 16 | 20.7 | 26 | 37.8 | 29 | 41.5 | 71 |
| 3-4 times | 2 | 25 | 4 | 33.3 | 5 | 41.7 | 11 |
| ≥5 times | 1 | 16.7 | 2 | 33.3 | 2 | 50 | 5 |
| **Learning Concentr.** | | | | | | | |
| No | 31 | 45.6 | 25 | 36.8 | 12 | 17.6 | 68 |
| Yes | 34 | 14.6 | 100 | 42.9 | 99 | 42.5 | 233 |
| **Coping** | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Warm comp. | 3 | 16.7 | 7 | 38.9 | 8 | 44.4 | 18 |
| Rest/sleep | 19 | 18.1 | 47 | 44.8 | 39 | 37.1 | 105 |
| Distraction | 43 | 24.2 | 71 | 39.9 | 64 | 36 | 178 |

**Source: Primary data, 2025**

**Table 3.** Relationship Between BMI and Degree of Dysmenorrhea

| Body Mass Index | Dysmenorrhea Degree | | | | | | Total | *p* |
|---|---|---|---|---|---|---|---|---|
| | Mild (n=65) | | Mod. (n=125) | | Sev. (n=111) | | | |
| | n | % | n | % | n | % | | |
| *Underweight* | 19 | 14.1 | 55 | 40.7 | 61 | 45.2 | 135 | |
| Normal | 29 | 29.6 | 40 | 40.8 | 29 | 29.6 | 98 | 0.021* |
| *Overweight* | 17 | 25.0 | 30 | 28.2 | 21 | 25.1 | 68 | |

***Chi-square test***

The distribution of the relationship between body mass index and the degree of dysmenorrhea is presented in Table 3. The highest proportion of severe dysmenorrhea was found in the *underweight* BMI group, namely 61 respondents (45.2%), whereas in the normal BMI group, most respondents experienced moderate dysmenorrhea, totaling 40 respondents (40.8%). The *Chi-square* test showed a significant relationship between BMI and the degree of dysmenorrhea (p=0.021).

## DISCUSSION

The demographic characteristics of the respondents generally showed no significant relationship with the degree of dysmenorrhea. This indicates that in a relatively homogeneous study population, variations in menstrual pain were more likely to be influenced by biological and clinical factors than by demographic factors. Ethnicity was the only demographic variable that showed a significant relationship with the degree of dysmenorrhea, which may reflect the influence of cultural background on pain perception, pain expression, and health-seeking behavior. This finding is consistent with Srikanth et al., who stated that pain is a subjective experience influenced by cultural values, social norms, and individual interpretation of pain[7].

Most respondents were from grade 11, indicating that the findings of this study mainly represent students in middle adolescence. Based on age, most respondents were 16 years old, a period in which hormonal changes and maturation of the central nervous system are still actively occurring. These conditions may play a role in emotional regulation, stress response, and pain perception[8].

Most respondents were first-born children, a position often associated with higher family expectations and psychosocial demands than those experienced by later-born children. The role of being the eldest child may influence emotional regulation, stress response, and the way physical complaints, including pain, are expressed[9,10]. In addition, most respondents came from complete families, which generally provide better emotional support and psychosocial stability. The presence of both parents may contribute to adolescent supervision, emotional regulation, and stress reduction, which may ultimately affect health perception and physical complaints among adolescents[11].

Most parents of respondents had a senior high school or equivalent level of education. Parental education may influence parenting patterns, the ability to understand health information, and family decision-making processes. Parental education is also related to family health behavior, stress management, and the way families perceive adolescent health conditions[12,13].

Furthermore, most respondents came from families with an income of less than IDR 2,000,000 per month, indicating socioeconomic limitations. Low economic status may limit family access to nutritious food and health services, increase psychosocial pressure within the family, and contribute to the risk of undernutrition among adolescents, which may ultimately affect health status and increase vulnerability to physical complaints[11].

The distribution of body mass index showed that most respondents were categorized as *underweight*, reflecting ongoing nutritional problems among adolescent girls during the period of growth and reproductive system maturation[14]. The most common age at menarche was 12-13 years, and this group showed a relatively high proportion of moderate to severe pain. Early menarche is associated with hormonal instability in the early phase of menstruation, irregular ovulatory cycles, and increased endometrial prostaglandin production, which triggers uterine contractions and vasoconstriction of uterine blood vessels, thereby increasing the intensity of menstrual pain[15,16].

Although most respondents had a normal menstrual cycle, moderate to severe dysmenorrhea remained dominant. This suggests that menstrual pain is more strongly influenced by prostaglandin activity, uterine inflammation, and individual pain threshold than by cycle length alone[17]. The most common menstrual duration was 7 days, with the dominant pain duration being 2 days, consistent with the peak of pain in the early phase of menstruation[18]. Most respondents did not use analgesics and still attended school despite experiencing dysmenorrhea, reflecting the normalization of menstrual pain and academic demands, although this condition continued to affect learning concentration and comfort at school[9]. The most frequently used coping strategy was distraction, while active

non-pharmacological methods such as warm compresses were still rarely used, even though they have been shown to reduce pain intensity[19].

Undernutrition is related to low body fat reserves, which play a role in reproductive hormone regulation, especially estrogen. This condition may trigger hormonal imbalance, menstrual cycle instability, and increased endometrial prostaglandin production, leading to stronger uterine contractions and more severe menstrual pain[20,21]. Low BMI in adolescents may be influenced by inadequate calorie intake, irregular eating patterns, excessive physical activity, medical conditions, and psychological stress, all of which may reduce the body's physiological capacity to regulate pain perception and worsen dysmenorrhea complaints[22].

The results of this study showed a significant relationship between BMI and the degree of dysmenorrhea (p=0.021). This finding indicates that nutritional status imbalance plays an important role in increasing the severity of menstrual pain among adolescent girls.

Nutritional status imbalance, both *underweight* and *overweight*, may influence the degree of dysmenorrhea through different but interrelated hormonal and metabolic mechanisms. In *underweight* conditions, low energy reserves and low body fat mass may disrupt the regulation of metabolic hormones such as leptin and ghrelin, which affects the balance of estrogen and progesterone and increases endometrial prostaglandin production. This condition causes stronger uterine contractions, myometrial ischemia, and increased menstrual pain intensity. Conversely, in *overweight* conditions, increased adipose tissue that is hormonally and inflammatory active may trigger chronic inflammation and changes in reproductive hormonal balance, ultimately increasing prostaglandin levels and the risk of dysmenorrhea[20,23].

The findings of this study are in line with several previous studies reporting that low BMI is associated with a higher risk of severe dysmenorrhea, particularly through impaired estrogen regulation, hormonal imbalance, and increased prostaglandin activity. Similar findings were also reported by Uni et al. in Bulukumba Regency and by Aktas, who emphasized the role of BMI and dietary habits in determining the severity of dysmenorrhea[1,2,23–25].

These findings are consistent with most literature confirming that nutritional status imbalance, particularly *underweight* status, contributes to increased dysmenorrhea severity through hormonal and metabolic mechanisms. Differences in findings between studies may be influenced by population characteristics, pain assessment methods, nutritional status classification, lifestyle factors, and other variables that could not be fully controlled in this study.

## CONCLUSION

The body mass index of adolescent girls at SMAN 8 Gowa showed that nearly half of the respondents were categorized as *underweight* (44.9%), indicating that many respondents had undernutrition.The degree of dysmenorrhea among adolescent girls at SMAN 8 Gowa showed that most respondents experienced moderate dysmenorrhea (41.5%), followed by severe dysmenorrhea (36.9%), which may interfere with daily activities and the learning process.There was a significant relationship between body mass index and the degree of dysmenorrhea among adolescent girls at SMAN 8 Gowa (p=0.021).

## SUGGESTION

Future researchers are expected to develop this study by adding other variables that may influence the occurrence and severity of dysmenorrhea, such as physical activity, dietary patterns, stress levels, family history, and non-pharmacological pain management behavior.

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