



The Influence of Nutritional Status and Age at Menarche on the Incidence of Dysmenorrhea among Female Adolescents at the Senior High School Level

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Abstract

This study aims to analyze the influence of nutritional status and age of menarche on the incidence of dysmenorrhea in female adolescents at the high school level. Dysmenorrhea is a common complaint of menstrual pain experienced by adolescents, which can affect their quality of life and activities. Factors such as nutritional status and age of menarche are believed to play an important role in determining the intensity and frequency of dysmenorrhea. This study uses an analytical observational design with a cross-sectional approach, involving 150 female adolescents from several high schools in East Java. Nutritional status data were collected through body mass index (BMI) measurements, while the age of menarche was obtained through a questionnaire. The incidence of dysmenorrhea was measured based on the adolescents' subjective reports of the intensity of menstrual pain experienced. Data analysis was performed using chi-square tests and logistic regression to determine significant relationships between these variables. The results of the study show that poor nutritional status and younger age of menarche have a significant influence on the increased incidence of dysmenorrhea in female adolescents. These findings can provide important information for healthcare professionals and educators to offer appropriate interventions in reducing the impact of dysmenorrhea on female adolescents.

Keywords

nutritional status,
age of menarche,
dysmenorrhea,
female adolescents,
high school

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Introduction

Dysmenorrhea is a common condition experienced by adolescent girls, characterized by menstrual pain occurring at the onset of the menstrual cycle. The occurrence of dysmenorrhea can significantly affect daily activities and the quality of life of adolescents and may even lead to school absenteeism (Afriani & Rainidiya, 2024). According to a study by Maryam *et al.* (2016), approximately 50–90% of adolescent girls experience dysmenorrhea, and its negative impacts extend beyond the

physical domain to include psychological aspects as well. Dysmenorrhea is classified into two types: primary and secondary. Primary dysmenorrhea commonly occurs in adolescents without any underlying medical conditions, whereas secondary dysmenorrhea is often associated with specific medical disorders (Karout *et al.*, 2021).

Several factors influence the occurrence of dysmenorrhea among adolescent girls, including nutritional status and age at menarche. Nutritional status, frequently measured using the Body Mass Index (BMI), plays a crucial role in reproductive health, including dysmenorrhea. Research by Yuniandry *et al.* (2014) indicates that poor nutritional status can increase the likelihood of experiencing more severe dysmenorrhea, which may be due to hormonal imbalances commonly found in undernourished individuals. Conversely, good nutritional status alleviates dysmenorrhea symptoms (Ariyanty *et al.*, 2024).

Age at menarche, which refers to the age at first menstruation, is also known to be associated with the occurrence of dysmenorrhea. A study by Hatmanti *et al.* (2022) reveals that adolescents who experience menarche at a younger age tend to suffer from more frequent and severe dysmenorrhea. This may be related to hormonal development and reproductive system maturity variations in adolescents undergoing early menarche. Furthermore, early menarche is influenced by genetic, environmental, and nutritional factors (Ramraj & Subramanian, 2021).

Among adolescent girls, dysmenorrhea can have significant psychological impacts, including stress, anxiety, and depression, all of which may further diminish their quality of life. This condition also affects academic performance, as many adolescents report being distracted during menstruation, impairing their ability to concentrate (Ahuja *et al.*, 2016). Therefore, understanding the factors influencing dysmenorrhea in adolescent girls is crucial for providing appropriate interventions and mitigating its effects.

Research on the factors influencing dysmenorrhea among adolescent girls in Indonesia remains limited, particularly studies focusing on nutritional status and age at menarche. Previous studies (Iis & Rohaeni, 2022; Maryam *et al.*, 2016) have attempted to identify contributing factors, but few have explored the relationship between nutritional status, age at menarche, and dysmenorrhea. This highlights a gap in current knowledge that warrants further investigation.

This study aims to analyze the influence of nutritional status and age at menarche on the occurrence of dysmenorrhea in high school-aged adolescent girls. Employing an analytical observational approach, this research seeks to provide a clearer understanding of the factors contributing to dysmenorrhea in this population. Moreover, the findings are expected to offer valuable insights for healthcare professionals, educators, and parents in supporting adolescent girls in managing dysmenorrhea more effectively. Specifically, this study aims to (1) identify the relationship between nutritional status and the occurrence of dysmenorrhea in high school-aged adolescent girls; (2) analyze the effect of age at menarche on the occurrence of dysmenorrhea; and (3) determine whether there is a significant relationship between nutritional status and age at menarche with the intensity of dysmenorrhea experienced by adolescent girls. Thus, the results of this study are expected to provide practical recommendations for the prevention and management of dysmenorrhea among adolescent girls.

Through this research, it is hoped that greater awareness will be fostered regarding the importance of maintaining good nutritional status from an early age and recognizing age at menarche as a risk factor for dysmenorrhea. This knowledge is crucial in promoting adolescent reproductive health and improving their overall quality of life in the future.

Research Methods

This study employed an analytical observational design with a cross-sectional approach to examine the influence of nutritional status and age at menarche on the incidence of dysmenorrhea among female adolescents at the senior high school level. This design was selected as it enables the

identification of relationships between specific factors (nutritional status and age at menarche) and the occurrence of dysmenorrhea at a single point in time without involving any form of intervention. Moreover, this approach is appropriate for exploring potential causal relationships between the investigated variables.

The study population comprised female adolescents attending senior high schools in East Java. The sample was selected randomly using a simple random sampling technique, including 150 female adolescents who met the inclusion criteria. The inclusion criteria specified female adolescents aged 15–18 years who had experienced menstruation for at least one year and did not present with any medical abnormalities affecting menstruation, such as endometriosis or other hormonal disorders. The exclusion criteria included adolescents who were pregnant or had health conditions that could affect their menstrual cycles.

Data was collected using three primary instruments: a questionnaire, nutritional status measurements, and interviews. Respondents' nutritional status was assessed using the Body Mass Index (BMI), calculated based on body weight (kg) and height (m). BMI measurements were performed using calibrated digital scales and height-measuring devices. BMI values were subsequently classified as usual, underweight, and obese nutritional status by the standard guidelines established by the World Health Organization (WHO, 2019).

Information regarding age at menarche was gathered through a questionnaire containing questions about the respondents' age at their first menstruation. Interviews were conducted to confirm the data and obtain additional information related to menstrual pain complaints. Dysmenorrhea was assessed based on the adolescents' subjective reports regarding the intensity of menstrual pain experienced, utilizing the Visual Analog Scale (VAS) to measure pain severity (0 = no pain, 10 = extremely severe pain). Respondents were asked to rate the intensity of pain experienced during their last three menstrual cycles.

For data analysis, the researchers employed the chi-square test to examine the association between nutritional status and the incidence of dysmenorrhea and logistic regression analysis to evaluate the effect of age at menarche on dysmenorrhea occurrence. Statistical analyses were performed using SPSS version 25. The chi-square test was used to determine whether a significant relationship existed between nutritional status and dysmenorrhea incidence, while logistic regression was applied to analyze the influence of age at menarche on dysmenorrhea severity. All analyses were conducted at a significance level of 0.05.

This study adhered to strict ethical procedures. Each respondent was provided with an explanation of the research objectives and the procedures to be undertaken, and the confidentiality of collected data was assured. Written informed consent was obtained from all participants prior to data collection. Additionally, the study received ethical clearance from the Research Ethics Committee of the affiliated institution, ensuring that the research was conducted in compliance with prevailing ethical guidelines. Through this research method, it is anticipated that significant associations will be identified between nutritional status and age at menarche with the incidence of dysmenorrhea in female adolescents, thereby contributing valuable insights toward the prevention and management of dysmenorrhea among this population.

Results and Discussion

The findings of this study indicate that among 150 female high school respondents, 67.3% experienced dysmenorrhea with varying intensities, ranging from mild to severe. Within this group, the majority were either underweight or overweight and had experienced menarche before the age of 12. These results reinforce the hypothesis that nutritional status and age at menarche are influential factors in the incidence of dysmenorrhea among adolescent girls.

Chi-square analysis revealed a significant association between nutritional status and the occurrence of dysmenorrhea ($p = 0.028$). Adolescents classified as underweight (BMI <18.5) or obese

(BMI >25) tended to report higher levels of menstrual pain compared to those with normal nutritional status. These findings align with the study by Fajrin *et al.* (2020), which suggests that nutritional imbalances may affect prostaglandin production—a compound responsible for uterine contractions and menstrual pain.

Regarding age at menarche, logistic regression analysis demonstrated that adolescents who experienced menarche at an earlier age (<12 years) had more than double the risk of experiencing dysmenorrhea compared to those whose menarche occurred between the ages of 12 and 14 (OR = 2.13; 95% CI: 1.21–3.76). This is consistent with research by Akunna *et al.* (2020), which found that early menarche is often associated with the reproductive system's inadequate preparedness for abrupt hormonal changes.

Moreover, the severity of dysmenorrhea was found to be greater among those with imbalanced nutritional status. Janapriya *et al.* (2024) emphasized that adolescents with iron deficiency and low energy intake are at higher risk of dysmenorrhea. This is attributed to the influence of micronutrient deficiencies on the body's inflammatory mechanisms, which can exacerbate uterine contractions.

Another noteworthy finding is that adolescents with obesity also reported significant dysmenorrhea. According to Chauhan & Kala (2012), excessive adipose tissue may increase estrogen production, resulting in hormonal imbalances that intensify menstrual symptoms. This suggests that both underweight and overweight conditions similarly elevate the risk of dysmenorrhea.

In terms of menarcheal age, it was observed that 38% of respondents experienced menarche before the age of 12, and 85% of this subgroup reported having dysmenorrhea. These data suggest that age at menarche may serve as an early predictor of potential menstrual disorders during adolescence. Supporting this, De Sanctis *et al.* (2019) reported that early menarche is frequently linked to irregular menstrual cycles, which are often associated with a higher incidence of menstrual pain.

The study also identified an interactive relationship between nutritional status and age at menarche and the incidence of dysmenorrhea. Respondents with early menarche and poor nutritional status faced the highest risk. This finding is supported by research conducted by Sari *et al.* (2021), who concluded that suboptimal nutritional status at the time of menarche increases vulnerability to menstrual pain due to endocrine imbalances.

From a psychosocial perspective, several respondents reported experiencing stress before or during menstruation due to the pain. Borjigen *et al.* (2019) highlighted that individual pain perception is significantly influenced by emotional state and overall health status. This underscores the importance of a holistic approach in addressing dysmenorrhea, including stress management and emotional support.

In-depth interviews revealed that most respondents lacked adequate education regarding dysmenorrhea management. Many chose to endure the pain without seeking medical treatment. These findings are corroborated by Johnson (1988), who noted that limited knowledge and restricted access to reproductive health services are significant barriers to effective dysmenorrhea management among adolescents.

This study highlights the critical role of schools and healthcare professionals in educating on the importance of balanced nutrition and the bodily changes that occur during puberty. Preventive approaches are essential to equipping adolescents with the awareness necessary to maintain their reproductive health from an early age. As recommended by Rabbitte & Enriquez (2019), reproductive health education should be integrated into the school curriculum to reach adolescents more effectively.

Furthermore, the study contributes to policy formulation in the field of adolescent health, particularly in efforts to address dysmenorrhea through nutritional interventions and monitoring of menarcheal age. Nutritional screening programs and menstrual monitoring can serve as strategic initial steps for the systematic prevention and management of dysmenorrhea within school settings.

However, this study has certain limitations. First, the cross-sectional design does not allow for establishing direct causal relationships. Second, the data on pain intensity are subjective and may be affected by perception bias. Future research using longitudinal designs and hormonal biomarker approaches would provide stronger empirical support.

Nonetheless, the results are highly relevant to real-world conditions and can be a foundation for developing more targeted intervention programs. The researchers recommend schools collaborate with adolescent health centers to provide routine screening and consultations on menstrual issues.

The practical implication of this study is the need for an integrated medical and educational approach to addressing dysmenorrhea. Strengthening school nutrition programs, training school counselors on reproductive health, and enhancing the role of community health centers (Puskemas) are strategic measures to mitigate the widespread issue of dysmenorrhea among Indonesian adolescent girls.

In conclusion, this study confirms that dysmenorrhea is not merely a biological issue but also a social and psychological one. Thus, a multidisciplinary, school- and community-based intervention is essential to support adolescent girls in navigating puberty in a healthy, balanced, and productive manner.

Conclusion

Based on the research findings, it can be concluded that nutritional status and age at menarche have a significant influence on the incidence of dysmenorrhea among female high school students. Adolescents with undernutrition or obesity are at higher risk of experiencing more severe dysmenorrhea. This underscores the importance of maintaining a balanced nutritional status early to prevent menstrual problems that may disrupt daily activities. Moreover, an earlier age at menarche is also associated with an increased incidence of dysmenorrhea, with girls who experience menarche before the age of 12 being twice as likely to suffer from menstrual pain compared to those with a later onset of menarche.

This study also highlights the crucial role of reproductive health education in schools in informing adolescent girls about the management of dysmenorrhea. In addition to nutritional interventions, psychological approaches are necessary to alleviate the emotional burden associated with menstrual pain. By equipping adolescents with adequate knowledge of managing dysmenorrhea, they are expected to face these challenges more effectively and confidently.

Overall, the findings of this study affirm that dysmenorrhea is not solely a biological issue but is also influenced by social and psychological factors. Therefore, a holistic approach is required in its management, encompassing nutritional interventions, reproductive health education, and emotional support, in order to improve the quality of life of adolescent girls and mitigate the adverse impacts of dysmenorrhea in their daily lives.

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