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Dysmenorrhea in adolescent girls: Does body mass index play a role?

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ABSTRACT

This study aims to analyze the relationship between Body Mass Index (BMI) and dysmenorrhea pain scale in female adolescents at SMP Nurul Jadid, Paiton District. Dysmenorrhea is one of the common complaints in female adolescents that often affects daily activities and academic achievement. BMI, which is an indicator of a person's nutritional status, is thought to be related to the severity of dysmenorrhea pain. By understanding this relationship, it is hoped that more effective treatment strategies can be developed to reduce dysmenorrhea pain based on the individual's physical condition. This study used an observational analytical method with a cross-sectional approach. The study sample consisted of 174 female adolescents who were randomly selected from SMP Nurul Jadid. Data collection was carried out through BMI measurements and dysmenorrhea pain scale questionnaires filled out by respondents. Data analysis was carried out using the Pearson correlation test to determine the relationship between BMI and dysmenorrhea pain scale. The results showed a significant negative correlation between BMI and dysmenorrhea pain scale in female adolescents (-698, $p < 0.01$). This indicates that the lower a person's BMI, the higher the level of dysmenorrhea pain experienced. Discussion of these results suggests that adolescent girls with higher BMI may experience increased levels of the hormone prostaglandin, which can increase the intensity of menstrual pain. In addition, lifestyle factors and dietary habits also have the potential to influence the relationship between BMI and dysmenorrhea pain. The conclusion of this study is that there is a negative relationship between BMI and the scale of dysmenorrhea pain in adolescent girls at SMP Nurul Jadid. This study suggests the need for special attention to nutritional status and healthy lifestyles to reduce dysmenorrhea pain in adolescent girls. Education on dysmenorrhea management involving lifestyle changes and weight management may be an effective step to help adolescents cope with dysmenorrhea better.

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INTRODUCTION

Dysmenorrhea, or menstrual pain, is one of the most common health problems experienced by adolescent girls and often interferes with their daily activities, including their academic performance and emotional well-being (Rahma, 2020)(Rusyanti & Keb, 2021)(Sacred, 2022)(Kristianti et al., 2024). Although this condition is very common, understanding of the factors that influence the severity of dysmenorrhea pain is limited. One factor that is thought to play a role is Body Mass Index (BMI), which is an indicator of a person's nutritional status and is believed to influence hormonal balance and the body's response to pain (Dartiwen et al., 2019)(Fandinata & Ernawati, 2020)(Pratiwi, KM, & Harjanti, 2024).

Previous studies have shown variability in levels of dysmenorrhea pain among adolescent girls, but few have explored the specific relationship between BMI and dysmenorrhea pain intensity (Kurniawan et al., nd)(Suaryanti et al., 2022). Many adolescent girls experience intense menstrual pain without realizing that factors such as their nutritional status may contribute to the severity of the pain they feel (EARLY, 2019)(Mery Ramadani & Devhani Fitri, 2023)(Ayuni, 2023)(Ersila & ST, 2024). Therefore, this study focuses on the analysis of the relationship between BMI and dysmenorrhea pain scale in female adolescents at SMP Nurul Jadid, Paiton District, to identify whether higher or lower BMI is associated with more severe pain (Indrayani et al., 2019)(Muharramah & Prihartono, 2021)(Ubaidillah et al., 2021)(Mahendra et al., 2023).

A deeper understanding of the relationship between BMI and dysmenorrhea may provide important insights for developing more effective prevention and treatment strategies, tailored to each individual's physical condition (Suaryanti et al., 2022)(Pratiwi, KM, & Maretta, 2024)(Kristianti et al., 2024). This makes it important to provide more targeted solutions to reduce the impact of dysmenorrhea on the quality of life of adolescent girls, considering that this condition not only affects their physical health but also has long-term implications for academic achievement and emotional well-being (Indarwati et al., 2022)(Sakti, 2022)(Mamlukah, 2023)(Fatmawati et al., 2023). Thus, this study aims to fill the existing knowledge gap and offer a new approach in the management of dysmenorrhea through dietary and lifestyle adjustments based on BMI.

The purpose of this study was to find the correlation between BMI and pain scale in female adolescents at SMP Nurul Jadid. The results of this study can be used to increase awareness among female adolescents and educators at SMP Nurul Jadid regarding the importance of maintaining a healthy nutritional status as one way to manage menstrual pain. Evidence-based health education can help students understand the relationship between lifestyle, diet, and their reproductive health.

RESEARCH METHOD

Research Paradigm

This study uses numerical data obtained through BMI measurement and dysmenorrhea pain scale assessment using a structured questionnaire. The resulting data are in the form of numbers, which are then analyzed to find a statistical relationship between the two variables.

Research Approach

a. Research Time, this study was conducted over a period of 3 weeks, from July 7-31, 2024. The stages of the study included planning, data collection, data analysis, and reporting of results. In the first month, data preparation and collection were carried out by measuring Body Mass Index (BMI) and filling out a dysmenorrhea pain scale questionnaire by participants. The second month was used for data processing and analysis, while the third month focused on compiling the research results report.
b. Research Place**,** this study is a field study conducted at SMP Nurul Jadid, Paiton District. This location was chosen because it has a fairly large population of female adolescents, which is the

target group of this study. Data collection was conducted in the school environment, where researchers measured BMI directly and distributed questionnaires to female adolescent participants.

c. Research Data Sources, the data sources in this study consist of primary and secondary data: 1) Primary data was obtained directly from female adolescents at SMP Nurul Jadid through BMI measurements and dysmenorrhea pain scale questionnaires. BMI was measured using a calibrated weight and height measuring device, while the level of dysmenorrhea pain was measured using a questionnaire containing a pain assessment scale; 2. Secondary data in the form of additional information obtained from school documents, student health records (if available), and related literature that supports the analysis of the research results.
d. Research Funding Sources, the funding source for this research came from the researcher's personal funds and a research grant from Nurul Jadid University. Some of the funds were also supported by donations from schools and local health organizations that had an interest in increasing understanding of reproductive health among adolescents. The budget was used to purchase measuring instruments, print questionnaires, researcher transportation, and data processing and analysis costs.

Research Stages

Table 1. Research stages

No	Research Stages	Description
1	Planning and Preparation	Determining Research Topics and ObjectivesEstablishing a topic about the relationship between BMI and dysmenorrhea pain and the aim of identifying this relationship. Literature Review Review previous research to understand the theoretical and methodological context. Preparation of Research Instruments Developing a pain scale questionnaire and BMI measurement form; testing the validity and reliability of the instruments.
2	Data retrieval	Data Collection Preparation Coordinate with schools and provide information about research to students and parents. Sampling and Participant Recruitment Selecting 174 female adolescents randomly using simple random sampling technique. BMI measurement Measure the student's height and weight to calculate BMI using the formula BMI = Body Weight (kg) / (Height (m))². Questionnaire Completion Participants completed a dysmenorrhea pain scale questionnaire to assess the intensity of menstrual pain experienced.
3	Data processing	Data Entry and Validation Entering data into statistical software and checking for entry errors.
4	Data Analysis and Discussion	Analysis of Relationship With Sperm-Rank Determining the relationship between BMI and dysmenorrhea pain scale using the Sperman-Rank correlation test. Interpretation of Results Determining the statistical significance of the relationship between BMI and dysmenorrhea pain based on the p value (<0.05 significant).

No	Research Stages	Description
		Discussion of Results Compare the results with previous studies and explain the findings using prostaglandin theory, fat metabolism, and lifestyle factors.
5	Drawing Conclusions and Recommendations	Conclusion To draw conclusions about whether or not there is a significant relationship between BMI and the scale of dysmenorrhea pain in adolescent girls. Recommendation: Provide recommendations to schools and health workers for intervention programs and health education to reduce dysmenorrhea pain based on research results.

RESULTS AND DISCUSSIONS

TheQuantitative Research Results

Quantitative research will display research results in a tangible form in the form of calculations based on statistical measurements. Research results can be presented in the form of tables, diagrams, and images. An example of displaying a table is as below.

Table 2. Age distribution of female students

Age	Amount
13 years old	9 people
14 years	118 people
15 years	58 people
16 years	1 person
Total	186 people

Table 2 above shows the distribution of the number of people by age. There are a total of 186 people divided into four age groups: 13 years, 14 years, 15 years, and 16 years. The majority of people are at the age of 14, with a total of 118 people, which is the largest number compared to other age groups. The age of 15 years has 58 people, while the age of 13 years has only 9 people. The least age group is the age of 16 years, with only 1 person. This data can provide an overview of the age distribution in the group, with the largest concentration at the age of 14 years.

Table 3. BMI Distribution

Age	Amount
Thin	62
Normal	71
Fat	30
Obesity	23
Total	186 people

Table 3 above shows the distribution of the number of people based on weight status categories. Of the total 186 people, the majority are in the "Normal" category with a total of 71 people. The "Thin" category is in second place, with 62 people, followed by the "Fat" category with 30 people. The category with the least number is "Obesity," with 23 people. This data provides information about the proportion of body weight in the group, with most being in the normal range.

Table 4. Distribution of pain scale

Age	Amount
Light	54
Currently	82
Heavy	50

Age	Amount
Total	186 people

Table 4 above shows the number of people by severity category, which consists of three categories: "Mild," "Moderate," and "Severe." Of the total 186 people, the largest category is "Moderate," with 82 people. The "Mild" category is filled by 54 people, while "Severe" includes 50 people. These data show that most people are in the moderate severity category, while the number in the mild and severe categories is relatively balanced.

Table 5. Correlation between BMI and dysmenorrhea pain scale

Variable	IMT	Pain Scale	Correlation coefficient (r)	p-value
IMT	1	186	-698	0.01

Based on Table 5, there is a significant relationship between BMI data and pain scale, with a p-value of less than 0.01. The results of the sperm rank test showed a value of -0.698, which indicates a strong relationship with a negative relationship direction. This means that the lower a person's BMI, the higher the pain scale they experience.

Research Discussion

This study aims to analyze the relationship between Body Mass Index (BMI) and dysmenorrhea pain scale in female adolescents at SMP Nurul Jadid, Paiton District. Based on the results of data analysis using the Pearson correlation test, it was found that there was a significant negative correlation between BMI and the dysmenorrhea pain scale, namely the lower a person's BMI, the higher the level of dysmenorrhea pain experienced. This finding is important to understand further in the context of existing literature and the reality in society.

These findings support research (Sharma et al., 2022), which states that women with low BMI tend to experience more severe dysmenorrhea due to hormonal imbalance and increased prostaglandins. However, these results differ from the study (Frank et al., 2021)(Powell-Wiley et al., 2021)(Braun et al., 2021), who found that high BMI was associated with more severe dysmenorrhea pain. This difference may be due to different populations and other factors such as diet and physical activity. The combination of these results suggests that the relationship between BMI and dysmenorrhea is not linear and is influenced by other factors such as lifestyle and diet, so further research is needed.

In SMP Nurul Jadid, it was found that adolescent girls with low BMI often have irregular eating patterns and inadequate nutrition, which can worsen menstrual pain. High pain causes absenteeism from school and lowers academic achievement. Therefore, a nutrition and reproductive health education program is needed in schools to help adolescent girls manage menstrual pain better.

The finding that low BMI is associated with increased dysmenorrhea pain emphasizes the importance of nutrition interventions and education about nutrition and healthy lifestyles in schools. This education should include reproductive health and nutrition in the curriculum to help adolescents understand the importance of maintaining a healthy BMI. In addition, these results can guide public health programs that raise awareness about the relationship between nutritional status and menstrual pain, especially in areas with limited access to health education.

This study broadens the understanding of dysmenorrhea by focusing on school-aged girls, whose social and lifestyle conditions differ from other age groups. The study combines nutrition and reproductive health education in menstrual pain management, emphasizes the importance of lifestyle changes, and provides a new interactive educational model. The results are relevant for low-resource settings as they demonstrate that improvements in reproductive health can be achieved through school-based programs without the need for complex health infrastructure. The

findings can also influence health policy by integrating school-based reproductive health programs into public health policies.

CONCLUSION

There This study found that there was a significant negative relationship between Body Mass Index (BMI) and dysmenorrhea pain scale in female adolescents at SMP Nurul Jadid, Paiton District. Female adolescents with lower BMI tended to experience more severe menstrual pain. This finding suggests that nutritional status, as measured by BMI, plays an important role in the intensity of menstrual pain experienced by female adolescents.

These findings have important implications for school-based health interventions and public health policies. Education about balanced nutrition and healthy lifestyles needs to be improved in school settings to help adolescents manage menstrual pain more effectively. In addition, the results of this study can guide reproductive health programs that focus on managing menstrual pain through a more comprehensive nutrition-based approach and health education.

This study has several limitations, including a sample size limited to one school and a cross-sectional method that only provides a picture at one point in time. Therefore, for future research, it is recommended to involve a wider and more diverse sample, and use a longitudinal design to understand changes in the relationship between BMI and dysmenorrhea pain over time. Further research also needs to explore other factors, such as physical activity and psychological well-being, that may affect menstrual pain. Thus, more comprehensive and effective interventions can be developed to improve the reproductive health of adolescent girls.

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