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The relationship between nutritional status and the incidence of premenstrual syndrome (PMS) in adolescent girls

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Abstract

Background: Adolescent girls are a group of women aged 10-19 who are transitioning from childhood to adulthood. During this developmental phase, complex physical, psychological, and social changes occur, including the onset of the menstrual cycle, which is often accompanied by various complaints. One common complaint is Premenstrual Syndrome (PMS). PMS is a health condition often experienced by adolescent girls during puberty.

Purpose: To determine the relationship between nutritional status and the incidence of premenstrual syndrome (PMS) in adolescent girls.

Method: This quantitative study used a descriptive analytical approach and a cross-sectional design. This study was conducted at SMPN 4 Gamping. Sample selection was determined using a purposive sampling technique with the Slovin formula. Data analysis was performed using univariate and bivariate analysis with the Somers's d test at a significance level (α) of 0.05.

Results: The analysis using the Somers's d test showed a coefficient value of -0.279 with a significance value of $p = 0.034$. Since the p value < 0.05 indicates a significant relationship between nutritional status and the incidence of Premenstrual Syndrome (PMS) in adolescent girls, the coefficient value of -0.279 indicates a negative relationship with a weak correlation.

Conclusion: There is a significant relationship between nutritional status and the incidence of Premenstrual Syndrome (PMS) in adolescent girls.

Keywords: Adolescents; Nutritional Status; Premenstrual Syndrome.

INTRODUCTION

Adolescence is a crucial period in the human life cycle, especially for girls, who experience significant changes. According to the World Health Organization (WHO), adolescent girls are women aged 10-19 who are transitioning from childhood to adulthood. During this developmental phase, complex physical, psychological, and social changes occur, including the onset of the menstrual cycle, which is often accompanied by various symptoms.

One common symptom is Premenstrual Syndrome (PMS). PMS is a health condition often experienced by adolescent girls during puberty. During this developmental phase, many girls experience PMS symptoms that can impact their

quality of life. Defines PMS as a collection of physical, emotional, and behavioral symptoms that appear cyclically during the luteal phase of the menstrual cycle, usually 7-14 days before menstruation, and generally disappear when menstruation begins (Nadrah, Dornic, & Handayani, 2024).

PMS symptoms in adolescent girls can be categorized into three main groups: physical, emotional, and behavioral. Physically, common symptoms include lower abdominal pain, breast tenderness or swelling, headaches, fatigue, and bloating. Emotionally, adolescent girls often report symptoms such as irritability, increased anxiety, drastic mood swings, and feelings of sadness or

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depression (Hermawan & Agung, 2024). These symptoms not only affect physical health but can also interfere with concentration, lower academic performance, and impact social relationships with peers and family.

The impact of PMS on adolescent girls should not be underestimated, as it can impact various aspects of life. Decreased academic performance due to difficulty concentrating is one frequently reported impact (Nugroho, 2020). Furthermore, PMS can also trigger psychological disorders such as stress and anxiety. In severe cases, PMS can even develop into Premenstrual Dysphoric Disorder (PMDD). PMDD is a severe form of premenstrual symptoms that is cyclical (appearing in the luteal phase the week before menstruation and improving or disappearing after menstruation begins). PMDD differs from PMS due to the severity of symptoms (causing significant functional impairment in work/relationships/daily activities) and stricter diagnostic requirements (at least 5 of 11 symptoms, with ≥ 1 core affective symptom such as mood lability, irritability, depression, or anxiety).

PMS is often triggered by hormonal fluctuations, particularly changes in estrogen and progesterone concentrations leading up to menstruation, which can affect neurotransmitters such as serotonin and Gamma Aminobutyric Acid (GABA), resulting in a variety of physical and emotional symptoms. In addition to hormonal factors, eating habits, daily behavior, and an individual's chronotype profile have also been shown to contribute to the risk of PMS (Rahmah, Afiattami, Khoiriani, & Wahyurin, 2025). Phytoestrogen intake, and sleep-wake rhythm (chronotype) are significantly associated with the occurrence of PMS in adolescent girls. These variables interact with physiological factors, such as reproductive hormone balance, as well as nutritional and psychological factors, which contribute to the emergence of PMS symptoms (Lisnawati & Danefi, 2024).

Nutritional status is one of the factors influencing the occurrence of PMS. Nutritional status is the condition of the body resulting from food consumption and nutrient utilization, and reflects the balance between energy intake and energy expenditure by the body. Assessment of adolescent nutritional status is generally carried out through anthropometric measurements such as Body Mass Index (BMI),

which can indicate whether a person is undernourished, normal, or overnourished. Adolescent nutritional status is strongly influenced by diet, physical activity, and psychosocial conditions. An imbalanced nutritional status, whether deficient or overnourished, can negatively impact hormonal function, including hormones that play a role in the menstrual cycle (Purnamasari, Supariasa, Komalyna, & Riyadi, 2022). Adolescent girls with malnutrition (underweight, BMI < 18.5) are at risk of experiencing hormonal disorders that can exacerbate PMS symptoms (Haniyah & Dewi, 2024). Adolescents with undernourished or overnourished status are more likely to experience menstrual disorders and more severe PMS symptoms than those with normal nutritional status (Lestari, Kustiyah, & Khomsan, 2024).

Globally, the prevalence of PMS is quite significant. WHO data (2023) shows that approximately 80% of women of reproductive age experience various PMS symptoms, with 20-30% reporting symptoms severe enough to require special treatment. At the national level, the results of the Indonesian Adolescent Reproductive Health Survey revealed that 70% of adolescent girls in Indonesia experience various PMS symptoms (Ministry of Health of the Republic of Indonesia, 2023). More specific data from the Yogyakarta Special Region Health Office (2023) shows a more concerning situation, where 75% of adolescent girls in Yogyakarta reported experiencing PMS symptoms, with 30% experiencing severe symptoms that significantly disrupted their daily academic activities and social interactions. This high prevalence rate indicates that PMS is a serious health problem and requires greater attention, especially among adolescent girls who are undergoing growth and development (Yogyakarta Special Region Health Office, 2025).

RESEARCH METHOD

This quantitative research used a descriptive analytical approach and a cross-sectional design. This study was conducted at SMPN 4 Gamping, with 85 students. The sample was selected using purposive sampling with the Slovin formula. Inclusion criteria included ninth-grade female students at SMPN 4 Gamping who were menstruating, willing to participate, and present at school during the study.

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Exclusion criteria included female students experiencing chronic illness or undergoing hormonal therapy that could affect their menstrual cycles, and female students with extreme eating patterns or eating disorders.

The independent variable was the students' nutritional status, while the dependent variable was the incidence of Premenstrual Syndrome (PMS) in adolescent girls. Furthermore, confounding variables were also used in this study. Confounding variables are other factors not the primary focus of the study but that may influence the relationship between the independent and dependent variables. Confounding variables include hormonal factors, dietary patterns, and psychosocial factors.

This study was conducted by objectively measuring variables such as nutritional status, calculated using Body Mass Index (BMI), and the incidence of premenstrual syndrome (PMS), measured using a standardized questionnaire. A descriptive approach was used to describe the distribution of nutritional status and PMS incidence among female students, while analytical methods were used to examine the relationship between the two variables. Data analysis was conducted using univariate and bivariate analyses. Univariate analysis was conducted to determine the frequency distribution of each variable, and bivariate analysis was conducted to determine the relationship between each studied variable using the Somers' d test with a significance level (α) of 0.05.

RESEARCH RESULTS

Table 1. Characteristics of Respondent (N=70)

Variable	Results
Age (Mean $\pm$ SD) Years	(14.81$\pm$0.546) (14-16)
14-16	70/100
Nutritional Status (n/%)	
Less	30/43.0
Normal	28/40.0
Excessive	12/17.0
PMS frequency (n/%)	
Light	17/24.3
Moderate	28/40.0
Heavy	25/35.6
Nutritional Status Category (n/%)	
Light	17/24.3
Moderate	28/40.0
Heavy	25/35.7

Table 1 shows that the average age of respondents and standard deviation is (14.81 $\pm$ 0.546) with an age range of 14-16 years. The majority of respondents have less nutritional status, namely 30 (43.0%) with moderate PMS frequency of 28 (40.0%) and the majority of respondents are in the moderate nutritional status category of 28 (40.0%).

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Table 1. Bivariate Test Results

Variabel	Uji Statistik	Nilai Koefisien (r)	P-value
Status Gizi-PMS	Somers'd	-0.279	0.034

The analysis using the Somers' d test showed a coefficient value of -0.279 with a significance value of $p = 0.034$. Because the p value < 0.05 , H_0 is rejected and H_a is accepted, indicating a significant relationship between nutritional status and the incidence of Premenstrual Syndrome (PMS) in adolescent girls. The coefficient value of -0.279 indicates a negative relationship between the two variables with a weak relationship strength. This negative relationship indicates that as respondents' nutritional status improves, the severity of PMS tends to decrease, while respondents with lower nutritional status tend to experience PMS with greater severity.

DISCUSSION

The research results showed that the majority of ninth-grade female students had suboptimal nutritional status, with a predominance of undernourished students, followed by normal nutritional status students, and a number of overnourished students. This situation indicates that nutritional issues remain a significant challenge in efforts to improve the health of adolescent girls in the school environment.

Nutritional status in adolescents is influenced by the balance between nutrient intake and the body's increasing needs as growth progresses. When nutritional needs are not optimally met, the body will experience various metabolic and growth disorders, leading to conditions of undernutrition or overnutrition. Various studies have shown that one of the main factors influencing adolescent nutritional

Physical activity also influences energy balance in adolescents. A mismatch between energy intake and energy expenditure can lead to weight changes that directly impact nutritional status. Adolescents with low physical activity levels and high-energy diets are at greater risk of overnutrition, while those who are physically active without adequate nutritional intake are at risk of malnutrition (Indrasari & Sutikno, 2020).

Therefore, nutritional issues in adolescents are not solely a matter of food consumption, but rather the result of the interaction of various determinants that need to be addressed comprehensively through nutrition education, improved diet, increased physical activity, and supportive environments conducive to adolescent health. Efforts to improve nutritional status during this phase are a crucial investment in improving the health of future generations. Consistent with this, other research also reported that nutritional

status is the quality of food consumption patterns, which also plays a significant role in determining nutritional status. A lack of dietary diversity, low intake of protein, vitamins, and minerals, and high consumption of fast food and sweetened beverages are closely associated with the emergence of nutritional problems in adolescents (Lathifah, Wulansari, & Rahmawati, 2024).

Furthermore, adolescents with a poor understanding of the importance of balanced nutrition tend to consume irregular meals, choose high-calorie but low-nutrient foods, and pay less attention to their daily nutritional adequacy. This condition significantly contributes to the occurrence of nutritional status disorders (Nasution, Nuraida, Putri, Raharsari, & Suhenda, 2023).

status based on body mass index (BMI) was significantly associated with the incidence of premenstrual syndrome (PMS) ($p = 0.001$), with adolescents with both underweight and overweight having a higher risk of PMS than adolescents with normal nutritional status. This strengthens the findings in this study that the proportion of female students with abnormal nutritional status is quite large and has the potential to affect their menstrual health (Zahrani, 2025).

Based on the research results, it was found that the incidence of Premenstrual Syndrome (PMS) among ninth-grade female students showed varying degrees of symptom severity, with the majority of respondents falling into the moderate to severe category, while others experienced mild symptoms. This finding confirms that PMS is not simply a minor complaint that can be ignored, but rather a significant

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health issue that can disrupt the physical, emotional, and social well-being of adolescent girls, potentially impacting daily activities such as concentration, mood, and relationships. Clinically, PMS is a collection of physical and psychological symptoms that occur during the luteal phase of the menstrual cycle and can impact quality of life if their intensity increases, as described in various scientific reports on the prevalence and characteristics of PMS symptoms in young women (Estiani & Djokosujono, 2020).

Research examining the relationship between diet and physical activity and the incidence of PMS among adolescents also indicates that daily diet plays a significant role in the intensity and frequency of PMS symptoms. In the study, adolescents who had an unhealthy diet and did not meet certain nutritional needs tended to report PMS symptoms more often than adolescents who had a balanced diet, especially in terms of micronutrient intake such as vitamins and minerals that are important for hormonal and nerve function (Nurbaiti & Neorfitri, 2023).

Adolescents' physical activity levels also correlate with the incidence of PMS. Adolescents with lower levels of physical activity tend to report more severe PMS symptoms than those who are physically active, possibly related to the role of physical activity in hormone regulation, energy metabolism, and reducing psychological stress, which contribute to PMS symptoms (Nisa, Hidayah, & Izzah, 2023). Observational research indicates that adequate physical activity is associated with a reduced risk of PMS symptoms, while light or insufficient physical activity can increase the intensity of symptoms such as pain, fatigue, and mood swings (Adhar, Suarniati, & Fajriansi, 2024).

Thus, the prevalence of PMS in female students, with the majority of cases in the moderate to severe category, reflects the need to understand the lifestyle factors that influence PMS symptoms in adolescents, particularly diet and physical activity. A deeper understanding of these aspects is crucial for designing appropriate promotive and preventive interventions to improve the quality of life of adolescent girls, including reproductive health education, improving eating behaviors, and encouraging a balanced, active lifestyle.

Based on the results of the bivariate analysis presented in Table 4.6, there is a significant

difference in the incidence of Premenstrual Syndrome (PMS) between nutritional status categories. In the group of female students with poor nutritional status, most respondents tended to experience PMS with a high level of severity. Conversely, in the group of female students with normal nutritional status, the dominance of PMS symptoms was at a moderate level, while in the group with over-nutrition status, the majority of female students reported PMS symptoms in the mild category. The results of the statistical test using Somers' d showed a correlation coefficient of -0.279 with a significance level of $p = 0.034$, which means there is a significant relationship between nutritional status and the incidence of PMS in adolescent girls. This negative coefficient indicates the opposite direction of the relationship, namely that the better the nutritional status of the female students, the lower the severity of PMS symptoms tend to be, while suboptimal nutritional status is associated with higher intensity of PMS. Research analyzing the relationship between nutritional status and vitamin B6 adequacy also shows that nutritional status is significantly associated with the incidence of PMS. Although vitamin B6 intake did not show a strong association in some cases, this study still confirms that poor nutritional status increases the risk of worsening PMS symptoms (Dewi, Masrurroh, & Muniroh, 2022).

Scientific studies indicate that diet quality and eating patterns are related to the incidence of PMS. Consuming foods high in vegetables, B vitamins, and minerals such as calcium, zinc, and omega-3s is associated with reduced PMS symptoms, while diets high in saturated fat, salt, or processed foods can exacerbate symptoms by potentially disrupting hormonal balance and insulin sensitivity (Oboza, Ogarek, Wójtowicz, Rhaiem, Olszanecka-Glinianowicz, & Kocelak, 2024). Furthermore, body fat mechanisms also play a role in estrogen metabolism through the ability of adipose tissue to convert androgens into active estrogens, which can influence reproductive hormone fluctuations and the intensity of PMS symptoms (Azadi, Madani, Payahoo, & Khodayari, 2024).

Supporting the relationship between nutritional status and PMS incidence has been found in other studies that also examined related variables. Research evaluating the relationship between nutritional status, PMS, and magnesium intake found

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that both nutritional status and magnesium adequacy were associated with PMS incidence in adolescent girls, with nutritional deficiency associated with the intensity of PMS symptoms (Estiani & Djokosujono, 2020).

Thus, in addition to statistical validity, the biological explanation and consistency with other studies provide strong support that the relationship between nutritional status and PMS incidence is not merely descriptive but has a clear scientific basis. This is crucial when designing health interventions that focus not only on symptom management but also on improving nutritional status through nutrition education and a healthy lifestyle starting in adolescence.

CONCLUSION

The majority of ninth-grade female students had poor nutritional status, at 42.9%. Furthermore, the most prevalent incidence of Premenstrual Syndrome (PMS) was moderate PMS, at 40.0%. The test results showed a significant relationship between nutritional status and PMS incidence in female adolescents ($p = 0.034$). This relationship was negative and weak, indicating that the better the nutritional status of the female students, the lower the severity of PMS tended to be.

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