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RELATIONSHIP BETWEEN ACADEMIC STRESS LEVELS AND MENSTRUAL CYCLE REGULARITY AMONG FEMALE STUDENTS AT VOCATIONAL HIGH SCHOOL AL AZHAR

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Abstract

Adolescent girls' reproductive health can be reflected through the regularity of their menstrual cycles, which are influenced by biological and psychological factors such as academic stress. Stress can disrupt the regulation of reproductive hormones through the activation of the hypothalamic pituitary adrenal (HPA) axis, potentially leading to menstrual irregularities. This study aimed to determine the relationship between academic stress levels and menstrual cycle regularity among adolescent girls at Vocational High School Al Azhar. This study used a cross-sectional methodology and a quantitative analytic observational design. 200 female students in grades X–XII who were chosen using complete sampling made up the study population. A validated menstrual cycle questionnaire and the Perceived Stress Scale (PSS) were used to gather data. The Chi-Square (χ^2) test was used to analyze the data. The results showed that most respondents were 17 years old (64.5%) and had normal nutritional status (68.5%). The majority experienced mild stress (59%) and had normal menstrual cycles (85.5%). However, statistical analysis revealed a significant relationship between academic stress levels and menstrual cycle regularity ($p = 0.005$). The higher the academic stress level, the greater the likelihood of experiencing menstrual irregularities. Therefore, school-based promotive and preventive interventions such as stress management education, healthy sleep patterns, and balanced lifestyle programs are recommended to support adolescent reproductive health.

Keywords *:* *Academic Stress, Adolescent Girls, Menstrual Cycle, Reproductive Health*

INTRODUCTION

One indicator of teenage girls' reproductive health is menstruation, which denotes a state of complete physical, mental, and social well-being rather than just the absence of disease or infirmity related to the menstrual cycle. [1]. A normal menstrual cycle typically lasts between 21 and 35 days. Among

adolescents, premenstrual symptoms, dysmenorrhea, and menstrual irregularities can negatively impact quality of life and interfere with their ability to learn and attend school regularly [2]. Recent studies have demonstrated a strong correlation between psychosocial factors, including academic stress, and both the frequency of menstrual disturbances and the severity of menstrual symptoms in adolescent and college populations. Multicenter studies and systematic reviews have revealed that psychological stress is associated with increased incidence of irregular menstrual cycles, dysmenorrhea, and premenstrual disorders among adolescents and university students [3].

Approximately 70–80% of women do not experience difficulties performing daily activities during menstruation. However, 20–30% suffer from premenstrual syndrome (PMS), often with severe symptoms. Physical and emotional symptoms of PMS typically appear one to two weeks before menstruation and may include bloating, cramps, fatigue, breast tenderness, and headaches, as well as mood changes, irritability, depression, hyperphagia, forgetfulness, and concentration difficulties [4][5][6][7].

Three to eight percent of women suffer from premenstrual dysphoric disorder, a more severe form of PMS marked by intense psychological distress [8]. The hypothalamic pituitary-adrenal (HPA) axis becomes physically active in response to prolonged stress, increasing cortisol release. Such neuroendocrine changes may disrupt the regulation of reproductive hormones (GnRH, LH, and FSH), causing menstrual disturbances such as oligomenorrhea, temporary physiological amenorrhea, or altered menstrual pain patterns. Stressful factors academic pressure, examinations, and heavy curriculum loads have been reported as key contributors to these disturbances in adolescent populations [9].

Over the past century, numerous studies have investigated the impact of menstruation on educational performance. A comprehensive review found that dysmenorrhea is significantly associated with academic difficulties, including absenteeism, lack of classroom participation, poor concentration, and decreased academic performance [10]. Over the past century, numerous studies have investigated the impact of menstruation on educational performance. A comprehensive review found that dysmenorrhea is significantly associated with academic difficulties,

including absenteeism, lack of classroom participation, poor concentration, and decreased academic performance [10]. Many female students avoid seeking medical assistance and instead self-medicate with over-the-counter pain relievers to manage menstrual pain [11].

This study is grounded in the high prevalence of menstrual disturbances among adolescent girls, which have been shown to be closely associated with psychosocial factors, particularly academic stress, through neuroendocrine mechanisms involving activation of the hypothalamic–pituitary–adrenal (HPA) axis. Unlike previous studies that predominantly focused on university students, generalized psychological stress, or specific menstrual symptoms such as dysmenorrhea and premenstrual syndrome, this research offers novelty by specifically examining the relationship between academic stress levels and menstrual cycle regularity among female students in a vocational high school setting, a population that has received limited attention. Consequently, this study provides new context-specific evidence that academic pressure in vocational education environments may directly affect adolescent reproductive health, highlighting the importance of school-based stress management and reproductive health education as preventive and promotive strategies.

Women's reproductive health is particularly crucial, especially regarding menstrual cycle regulation. Stress experienced by adolescent girls may affect both their current and future reproductive health. Therefore, healthcare providers should be better educated on stress management strategies to help adolescents maintain regular menstrual cycles. Understanding how to manage stress will support adolescent girls in preserving their reproductive well-being. Based on this background, this study aimed to investigate the relationship between academic stress levels and menstrual cycle regularity among female students at Vocational High School Al Azhar.

RESEARCH METHODS

This study employed a cross-sectional analytical observational quantitative approach to determine the relationship between academic stress levels and menstrual cycle regularity among female students at Vocational High School Al Azhar in 2025. The study population consisted of 200 students in grades X–XII, with total sampling applied, resulting in 200 respondents. Data were collected using

the Perceived Stress Scale (PSS) and a validated menstrual cycle questionnaire (validity ≥ 0.333; reliability ≥ 0.600). The Chi-Square (χ^2) test was used to examine the data, and a significance level of $p < 0.05$ was used. The STIKES Rustida Research Ethics Committee granted ethical approval for the study, which was carried out in October 2025 at SMK Al Azhar in Sempu District, Banyuwangi (No. 0009/EC/KEPK/X/2025).

RESULTS AND DISCUSSION

RESULTS

The study's conclusions about the "Relationship Between Academic Stress Levels and Menstrual Cycle Regularity Among Adolescent Girls at SMK Al Azhar" are presented in this part. The first day of data collecting was October 10, 2025. Before filling out the surveys, participants received written informed consent and a briefing on the study's procedure

Table 1. Characteristics of Respondents

Characteristics	Frequency (f)	Percentage (%)
Usia		
15 years	1	0.5
16 years	47	23.5
17 years	129	64.5
18 years	23	11.5
amount	**200**	**100**
Body Mass Index (BMI)		
Underweight (<18.5)	8	4
Normal (18.5–22.9)	137	68.5
Overweight (23–24.9)	34	17
Obese (≥25)	21	10.5
Amount	**200**	**100**
Sleep Duration		
<8 hours	27	13.5
≥8 hours	173	86.5
Amount	**200**	**100**
Menstrual Complaints		
Yes	17	8.5
No	183	91.5
Amount	**200**	**100**
Menstrual Cycle		
Normal (21–35 days)	171	85.5
Irregular (<21 or >35 days)	29	14.5
Amount	**200**	**100**
Academic Stress		
Normal	56	28
Mild	118	59
Moderate	26	13
Severe	0	0
Very Severe	0	0
Amount	**200**	**100**

Source: Primary Data, 2025

The research results show that the majority of respondents are 17 years old (64.5%), which reflects the mid-adolescent age group. Based on nutritional status, the majority of respondents had a normal BMI (68.5%), indicating good nutritional condition. Most respondents had a sleep duration of ≥8 hours per day (86.5%), indicating sufficient rest patterns. Additionally, the majority of respondents did not experience any complaints during menstruation (91.5%), while only a small percentage (8.5%) reported menstrual complaints such as period pain or discomfort. Based on the cycle pattern, 85.5% of respondents had normal menstrual cycles (21–35 days), while 14.5% experienced cycle irregularities. Regarding academic stress levels, the majority of respondents were in the mild stress category (59%), followed by normal stress (28%), and moderate stress (13%), while no respondents experienced severe or very severe stres.

Table 2. Relationship Between Academic Stress Levels and Menstrual Cycle Regularity

	Menstrual Cycle						
Stress Level	**Normal**		**Irregular**		**amount**		**P value**
	n	**%**	**N**	**%**	**n**	**%**	
Normal	54	31,6	2	6,9	56	28,0	
Mild	93	54,4	25	86,2	118	59,0	0,005
Moderate	24	14,0	2	6,9	26	13,0	
Severe	0	0,0	0	0,0	0	0,0	
Very Severe	0	0,0	0	0,0	0	0,0	
amount	171	100	29	100	200	100,0	

The analysis results show that the majority of respondents with mild stress (86.2%) experienced abnormal menstrual cycles, while respondents with normal stress (31.6%) and moderate stress (14%) were more likely to have normal menstrual cycles. There is a high association between the menstrual cycle and academic stress levels among female teenagers at SMK Al Azhar, according to the results of the Chi-Square statistical test, which showed a p-value of 0.005 ($p < 0.05$). Therefore, higher levels of academic stress are associated with a higher likelihood of irregular menstrual periods.

DISCUSSION

The findings demonstrated a significant relationship between academic stress and menstrual cycle irregularity among adolescent girls (p = 0.005).

Stress can affect the menstrual cycle because when the body experiences stress, the nervous system triggers the activation of the hypothalamic-pituitary-adrenal (HPA) axis, which then increases the production of stress hormones like cortisol. This can inhibit ovulation and cause irregular or delayed cycles because stress hormones disrupt the balance of reproductive hormones that regulate menstruation [12].

Physiologically, chronic stress can suppress the release of GnRH, which is essential for initiating ovulation, and lead to an imbalance of estrogen and progesterone hormones necessary for a normal menstrual cycle [13][14]. Prolonged stress has also been linked to an increased risk of menstrual disorders, including changes in the duration and intensity of menstrual bleeding. This aligns with the study by Amalia et al. (2023), which found that stress disrupts gonadotropin-releasing hormone (GnRH) activity, affecting hormonal balance [2]. Most respondents were 17 years old an age of hormonal transition where psychological stress can easily disturb menstrual regulation. According to Larasati (2023), this period is a developmental phase where hormonal balance is not yet fully stable, making psychological stress easily trigger changes in the menstrual cycle [15]. This is supported by Nuraini's (2022) research, which shows that adolescents with high stress have a 2.4 times greater risk of experiencing menstrual cycle disorders compared to those who are not stressed[16].

Efendi et al. (2024) explain that stress can affect cortisol and prolactin secretion, impacting ovulation. Therefore, even with normal nutritional status, the cycle can still be disrupted due to psychological factors [17]. The research also found that most respondents had a normal BMI, but the group with mild to moderate stress experienced more irregular cycles [18]. This finding is supported by an international study by Mittiku et al. (2022) which reported a relationship between academic stress, sleep deprivation, and irregular lifestyle and menstrual dysfunction in female university students in Ethiopia. They stated that chronic stress activates the hypothalamic-pituitary-adrenal (HPA) axis and reduces estrogen secretion,

leading to prolonged cycles or even temporary amenorrhea [19].

A similar condition was also described by Bhardwaj, Yadav, and Tanej(a 2023), stating that adolescents with high stress levels have an odds ratio of 2.8 for experiencing irregular menstruation [20]. This mechanism occurs because stress increases cortisol and suppresses the release of luteinizing hormone (LH) and follicle-stimulating hormone (FSH), thereby inhibiting ovulation. Additionally, Salsabila (2024) research found that stress triggered by academic pressure, such as exams or grade demands, can lead to changes in sleep patterns, reduced nutritional intake, and increased physical fatigue, all of which contribute to hormonal imbalances [21]. This pattern aligns with Calcaterra et al. (2024), who showed that energy imbalance and physiological stress can lead to decreased leptin levels and impaired ovarian function in adolescent girls [22].

This study also observed that the majority of respondents slept for more than 8 hours, but a small percentage still experienced cycle disturbances. This may be influenced by sleep quality, not just duration. A study by Liu et al. (2025) showed that even with sufficient sleep, emotional stress can reduce sleep quality and disrupt neuroendocrine function, which plays a role in regulating the menstrual cycle [23]. The results of this study support the findings of Adiwinoto et al. (2025) that academic stress is significantly associated with menstrual irregularities, especially in students with high academic pressure and unbalanced rest time [24].

Increased stress leads to chronic activation of cortisol, which inhibits GnRH pulsations in the hypothalamus, thereby disrupting the secretion of LH and FSH. As a result, the follicular phase becomes longer and menstrual cycles become irregular [25]. This finding is also consistent with Meriati, Masthura, and Nursa'adah (2025), who reported that 62% of adolescents with academic stress experienced menstrual cycles > 35 days. This shows that psychological factors have a real influence on hormonal balance in adolescents [26]. From a behavioral perspective, stress can also affect eating patterns, physical activity, and sleep habits. A study by Putri et al. (2025) confirms that maladaptive coping behaviors, such as staying up late or excessive caffeine consumption, can worsen menstrual cycle dysfunction [27]. Overall, the results of this study strengthen the evidence that academic stress plays a significant role in menstrual regularity in adolescents. Therefore, interventions focusing on

stress management, reproductive health education, and lifestyle balance need to be enhanced in the school environment [28]

CONCLUSIONS

The study concludes that higher academic stress levels significantly increase the risk of menstrual irregularities among adolescent girls. This effect occurs through neuroendocrine mechanisms involving HPA axis activation and disrupted reproductive hormone secretion. Therefore, school-based promotive and preventive strategies including stress management education, adequate sleep hygiene, and balanced nutrition are essential to maintain adolescent reproductive health.

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