

Association of Sleep Patterns and Stress with premenstrual Syndrome among Medical Students

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ABSTRACT

Background: Premenstrual syndrome (PMS) causes emotional, behavioral, and physical symptoms in women during the luteal phase. Poor sleep and high stress can worsen PMS, especially among medical students. This study aims to examine the association between sleep patterns, stress, and PMS severity in medical students. **Methods & Materials:** A cross-sectional study was conducted at Dhaka Medical College Hospital (July 2023–June 2024) among 80 female medical students to assess the association of sleep and stress with PMS. Data were collected via a self-administered questionnaire on demographics, menstrual history, PMS, sleep, and stress. Ethical approval and informed consent were obtained. SPSS was used for analysis, with Chi-square tests evaluating associations ($p < 0.05$). **Results:** Among 80 female medical students, most were aged 21–23 years and in 3rd–4th year. PMS was reported by 66.3%, mostly mild. Most participants slept 6–8 hours with fair sleep quality, though many experienced delayed sleep onset and night awakenings. Moderate to high stress was common. PMS prevalence was significantly higher among those with poor sleep ($p = 0.045$) and increased progressively with higher stress levels ($p = 0.018$). **Conclusion:** PMS is prevalent among female medical students, and its occurrence is significantly linked to poor sleep and high stress levels. Encouraging stress control and adequate sleep might alleviate PMS symptoms and enhance students' well-being.

Keywords: Sleep Patterns, Stress, premenstrual Syndrome.

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INTRODUCTION

Premenstrual syndrome (PMS) is a common cyclical condition affecting women of reproductive age and is characterized by a constellation of emotional, behavioral, and physical symptoms that typically occur during the luteal phase of the menstrual cycle and resolve with the onset of menstruation [1]. It is estimated that approximately 12% of women experience clinically significant premenstrual conditions that interfere with daily functioning [2]. Common manifestations of PMS include irritability, anxiety, depressed mood, emotional lability, fatigue, sleep disturbances, food cravings, bloating, breast tenderness, and peripheral edema [3]. Adequate sleep is essential for optimal physical and psychological health, with most adults requiring an average of seven hours of sleep per night. However, women are more prone to sleep disturbances than men, often due to hormonal fluctuations associated with the menstrual cycle. Sleep problems are particularly prominent in premenstrual conditions, including premenstrual dysphoric disorder (PMDD) [4]. Emerging evidence suggests that inadequate sleep—characterized by poor quality, reduced duration, or insomnia—is associated with increased severity of PMS and dysmenorrhea. Sleep disturbances may exacerbate PMS symptoms through

heightened inflammatory responses, increased psychological stress, and reduced melatonin secretion, which plays a role in reproductive and circadian regulation [5]. Several international studies have demonstrated a significant association between sleep patterns and PMS severity, particularly among medical and nursing students. Poor sleep quality has consistently been linked to more severe physical and emotional premenstrual symptoms. Students experiencing sleep disturbances have been shown to report higher scores on standardized PMS scales, indicating greater symptom burden [6]. Population-based data further support this association. The São Paulo Epidemiologic Sleep Study reported that women with PMS experienced poorer subjective sleep quality, increased prevalence of mild insomnia, and less restorative sleep compared to women without PMS, suggesting that sleep disturbances may persist throughout the menstrual cycle in affected individuals [7]. Psychological stress is another important factor influencing PMS. Medical students, in particular, are exposed to substantial academic and psychosocial stress, which may contribute to both sleep disruption and menstrual-related symptoms. Studies conducted in Bangladesh have reported high levels of stress, depression, sleep disturbances, and suicidal ideation among

medical students, especially during the early years of training [8]. Additionally, research among adolescents in Dhaka has shown that stress is more prevalent among females and is associated with inadequate sleep, sedentary lifestyle, and negative body image, underscoring the interconnected nature of stress, sleep, and mental health [9]. Despite the high prevalence of PMS, stress, and sleep disturbances among students in Bangladesh, there is a paucity of research examining the combined association of sleep patterns and stress with PMS severity using validated assessment tools, particularly among medical students. Furthermore, evidence regarding cycle-specific symptom patterns and potential mediating factors remains limited. Therefore, the present study aims to assess the association between sleep patterns, stress levels, and premenstrual syndrome among medical students in Bangladesh.

METHODS & MATERIALS

Study Design and Setting

This study was a cross-sectional analytical study conducted to assess the association of sleep patterns and perceived stress with premenstrual syndrome (PMS) among female medical students. The study was carried out at Dhaka Medical College Hospital, Dhaka, Bangladesh, over a one-year period from July 2023 to June 2024.

Study Population and Sample

The study population comprised female medical students enrolled in the MBBS program (1st to 5th year) at Dhaka Medical College. A total of 80 participants were recruited using convenience sampling. Inclusion criteria were females aged ≥ 18 years with regular menstrual cycles and willingness to participate. Exclusion criteria included students with psychiatric or endocrine disorders, current use of hormonal contraceptives or psychotropic medications, pregnancy, or lactation.

Data Collection Procedure

After obtaining ethical approval from the Dhaka Medical College Ethical Review Committee, eligible participants were invited to participate. The purpose of the study, voluntary participation, and confidentiality measures were explained, and written informed consent was obtained from each participant.

Data were collected using a self-administered structured questionnaire, which consisted of four sections: (1)

sociodemographic and menstrual history, including age, academic year, age at menarche, and menstrual cycle characteristics; (2) PMS assessment using a validated Premenstrual Syndrome Scale; (3) sleep patterns and quality using a validated sleep assessment tool; and (4) perceived stress measured with a validated stress scale. Participants completed the questionnaire in a private and quiet setting to ensure accurate reporting. All completed questionnaires were checked for completeness and subsequently coded for data entry.

Ethical Considerations

The study protocol was approved by the Institutional Ethical Review Committee of Dhaka Medical College. Participation was voluntary, confidentiality of responses was ensured, and participants had the right to withdraw at any time without any consequence

Statistical Analysis

Data were entered and analyzed using SPSS software. Descriptive statistics such as mean, standard deviation, frequency, and percentage were used to summarize participant characteristics, sleep patterns, stress levels, and PMS prevalence. The Chi-square test was used to assess associations between PMS severity and categorical variables such as sleep quality and stress level. A p-value of <0.05 was considered statistically significant.

RESULTS

Demographic Characteristics of Study Participants

Table 1 shows total of 80 participants were included in the study. Table 1 shows the distribution of participants by age and academic year. The majority were aged 21–23 years (46.3%), followed by ≤ 20 years (22.5%) and ≥ 24 years (31.3%). Regarding academic year, 3rd–4th year students represented the largest group (43.8%), followed by 1st–2nd year (33.8%) and 5th year students (22.5%).

Table 1

Distribution of Study Participants by Age and Academic Year ($n = 80$).

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	≤ 20	18	22.5
	21–23	37	46.3
	≥ 24	25	31.3
Academic year	1st–2nd	27	33.8
	3rd–4th	35	43.8
	5th	18	22.5

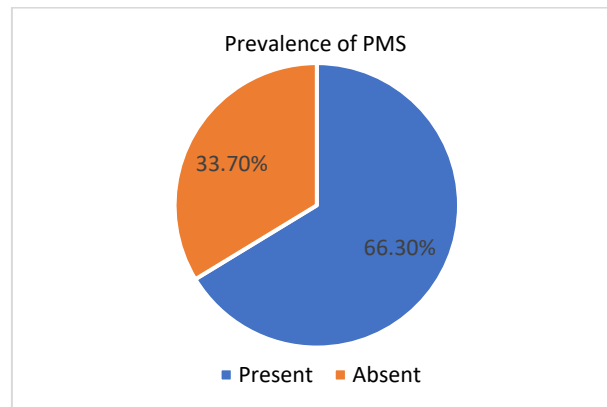


Figure 1 Prevalence of PMS among Study Participants ($n = 80$).

Prevalence of PMS

Figure 1 shows out of 80 participants, 53 (66.3%) reported premenstrual syndrome (PMS), while 27 (33.7%) had no PMS symptoms.

Severity of PMS Symptoms

Table II shows among the 53 participants with PMS, mild symptoms were most common, affecting 37 participants (69.8%), followed by moderate symptoms in 14

participants (26.4%). Severe symptoms were rare, reported by only 2 participants (3.8%).

Table II
Distribution of PMS Severity Among Participants with PMS (*n* = 53).

PMS Severity	Frequency (n)	Percentage (%)
Mild	37	69.8
Moderate	14	26.4
Severe	2	3.8

Sleep Pattern Characteristics
Table III presents majority of participants (62.5%) reported sleeping 6–8 hours per night, while 27.5% slept less than 6 hours and only 10% slept more than 8 hours. Sleep quality was fair in half of the participants (50%), poor in 31.3%, and good in 18.8%. Most participants (48.8%) took 15–30 minutes to fall asleep, 22.5% fell asleep in under 15 minutes, and 28.8% experienced longer sleep onset latency (>30 minutes). Night awakenings were common, with 37.5% waking 1–2 times per night and 18.8% waking three or more times, while 43.8% reported no awakenings.

Table III
Sleep Pattern Characteristics of Study Participants (*n* = 80).

Sleep Characteristic	Category	Frequency (n)	Percentage (%)
Sleep Duration	<6 hours	22	27.5
	6–8 hours	50	62.5
	>8 hours	8	10.0
Sleep Quality	Poor	25	31.3
	Fair	40	50.0
	Good	15	18.8
Sleep Onset Latency	<15 minutes	18	22.5
	15–30 minutes	39	48.8
	>30 minutes	23	28.8
Night Awakenings	None	35	43.8
	1–2 times	30	37.5
	≥3 times	15	18.8

Stress Levels among Participants
Table IV shows most participants (55%) reported moderate stress, while 25% had low stress and 20% experienced high stress. These results indicate that a majority of participants were experiencing moderate to high stress.

Table IV
Stress Levels among Study Participants (*n* = 80).

Stress Level	Frequency (n)	Percentage (%)
Low	20	25.0
Moderate	44	55.0
High	16	20.0

Association between Sleep Quality and PMS
Table V showed a significant association between sleep quality and PMS (*p* = 0.045). Participants with poor sleep quality were more likely to experience PMS (80%) compared to those with fair (62.5%) or good sleep quality (53.3%). This suggests that suboptimal sleep may contribute to higher prevalence of PMS symptoms among medical students.

Table V
Association Between Sleep Quality and PMS (*n* = 80).

Sleep Quality	PMS Present (n, %)	PMS Absent (n, %)	Total (n, %)	p-value
Poor	20 (80.0)	5 (20.0)	25 (100)	0.045*
Fair	25 (62.5)	15 (37.5)	40 (100)	
Good	8 (53.3)	7 (46.7)	15 (100)	

*Chi-square test; *p* < 0.05 considered statistically significant.

Association between Stress Level and PMS
Table VI presents a statistically significant association between stress level and PMS (*p* = 0.018). The prevalence of PMS increased progressively with higher stress levels, from 50% among participants with low stress to 66.7% in those with moderate stress, and 86.7% among those experiencing high stress. This finding suggests that higher perceived stress is strongly associated with the presence of PMS, indicating stress as an important contributing factor to PMS among the study participants.

Table VI
Association Between Stress Level and PMS ($n = 80$).

Stress Level	PMS Present (n, %)	PMS Absent (n, %)	Total (n, %)	p-value
Low	10 (50.0)	10 (50.0)	20 (100)	0.018*
Moderate	30 (66.7)	15 (33.3)	45 (100)	
High	13 (86.7)	2 (13.3)	15 (100)	

*Chi-square test; $p < 0.05$ considered statistically significant.

DISCUSSION

In this study, the majority of participants were aged 21–23 years, followed by those aged ≥ 24 years and ≤ 20 years. Regarding academic year, 3rd–4th year students constituted the largest group (43.8%), followed by 1st–2nd year and 5th year students. These findings are consistent with a previous study in which most participants were between 19 and 21 years old (68.8%, mean age 20.62 ± 1.58) and predominantly in the early to mid-stages of their academic journey (first to third year: 83.3%)^[10].

The prevalence of premenstrual syndrome (PMS) in the present study was 66.3%, indicating that PMS is a common condition among young women and female medical students. This prevalence aligns with the findings of Nisar et al. (2008), who reported PMS in 51% of medical students^[11]. Among participants with PMS, mild symptoms were most frequently reported (69.8%), followed by moderate symptoms (26.4%) and severe symptoms (3.8%). This distribution is comparable to Farrokh-Eslamlou et al. (2015), who observed mild, moderate, and severe PMS in 60.6%, 25.1%, and 14.2% of participants, respectively, highlighting that mild PMS is the most common severity category in this population^[12].

Regarding sleep patterns, 62.5% of participants reported sleeping 6–8 hours per night, 31.3% indicated poor sleep quality, 28.8% experienced prolonged sleep onset latency (>30 minutes), and 56.3% reported nighttime awakenings. These findings are consistent with previous literature, including a systematic review from the MENA region, which reported inadequate sleep and low sleep quality in approximately 60% of medical students, and a multi-university study where 36% of students slept less than 7 hours, 27% reported poor sleep quality, and 43% experienced prolonged sleep latency^[13,14]. This suggests that inadequate sleep is a prevalent concern among medical students.

Stress levels in the study population were moderate to high, with 55% of participants reporting moderate stress, 20% high stress, and 25% low stress. These results are comparable with Shrivastava et al., who reported that 64.4% of students experienced moderate stress, 21.3% high stress, and 14.4% low stress, indicating a similar distribution of perceived stress among university students^[15].

The present study identified a statistically significant association between sleep quality and PMS ($p = 0.045$). Participants with poor sleep quality were more likely to experience PMS (80%) compared to those with fair (62.5%) or good sleep quality (53.3%). This finding aligns with Ozisik Karaman et al. (2012), who reported that 75.6% of women with PMS experienced inadequate sleep, compared to 58.8% without PMS, suggesting that poor sleep may contribute to increased PMS prevalence^[16].

Similarly, stress was significantly associated with PMS ($p = 0.018$). The prevalence of PMS increased progressively with higher stress levels: 50% among participants with low stress, 66.7% with moderate stress, and 86.7% with high stress. This observation corresponds with Rafique et al., who reported that students with high perceived stress had 2 to 4 times greater risk of experiencing menstrual disturbances, including amenorrhea, dysmenorrhea, and PMS, highlighting the role of stress as a key contributor to menstrual symptomatology^[17].

Overall, these findings indicate that both suboptimal sleep and elevated stress are important factors associated with PMS among medical students. Interventions aimed at improving sleep hygiene and stress management may therefore play a critical role in mitigating PMS symptoms in this population.

CONCLUSION

This study emphasizes that PMS is very common among female medical students, with the majority of cases being mild. The quality of sleep and stress levels showed a significant connection to PMS, suggesting that students who sleep poorly and experience higher stress are more prone to PMS. The significance of managing stress and encouraging healthy sleep practices as possible approaches to alleviate PMS and enhance overall wellness in female students

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