

Original Research

Association between Premenstrual Syndrome and Stress Levels among Medical Students of a Teaching Hospital: A Cross-Sectional Study

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ABSTRACT:

Background and objectives: Premenstrual syndrome (PMS) is a prevalent cyclic disorder affecting women of reproductive age, characterized by a group of emotional, behavioural, and physical symptoms in the luteal phase of the menstrual cycle. Medical and dental students represent a particularly vulnerable population due to the high academic demands and psychosocial stressors they encounter. This study aimed to determine the prevalence of PMS and its association with perceived stress levels among medical and dental female students of a teaching hospital.

Materials and Methods: A descriptive cross-sectional study was conducted among 102 female MBBS and BDS students from December 2024 to May 2025. Ethical clearance was obtained from Institutional Review Committee (CMC-IRC/081/082/113). Premenstrual Symptoms were assessed using The Premenstrual Symptoms Screening Tool (PSST), and perceived stress was measured using the validated 10-item Perceived

Stress Scale (PSS-10). Data was analyzed using descriptive statistics and the Chi-square test, and a p-value of less than 0.05 was considered statistically significant.

Results: The mean age of participants was 20.34 ± 1.60 years. A total of 27 (26.5%) students experienced moderate to severe PMS. The majority (83, 81.4%) reported moderate perceived stress, while 18.6% had high perceived stress. The most common PMS symptoms were anger/irritability (moderate: 34, 33.3%), fatigue/lack of energy (moderate: 33, 32.4%), and difficulty concentrating (moderate: 33, 32.4%). A significant association was found between PMS severity and perceived stress levels ($p = 0.001$), with 8 (40.7%) students with moderate-to-severe PMS experiencing high perceived stress, compared to only 8 (10.7%) among those with mild or no PMS.

Conclusion: PMS is prevalent among medical and dental female students and was significantly associated with higher perceived stress. These findings highlight the need for institutional mental health interventions and reproductive health support within medical education settings.

Keywords: Medical students, Perceived Stress Score-10, premenstrual syndrome, Premenstrual Symptoms Screening Tool, perceived stress.

INTRODUCTION

Premenstrual syndrome (PMS) and its severe form Premenstrual dysphoric disorder (PMDD) are cyclic disorders that presents as behavioral, emotional, and physical symptoms in the late luteal phase [1]. These symptoms affect young women's quality of life, relationships, and day-to-day functioning [1,2]. Training in medicine and dentistry is extremely demanding, with heavy workload, lack of sleep, and multiple exams. The physical and psychological effects of PMS frequently coincide with this intense workload for female students, increasing

academic stress and resulting in decreased academic involvement and concentration, a rise in absenteeism, and a decline in overall academic performance [3,4].

Elevated stress due to the burden and overwhelming exposure to the medical field can cause dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis and its effect on release of ovarian hormones which may be a contributing factor to the severity of PMS [5]. Additionally, worsening PMS symptoms strongly correlates with anxiety, depression and increased stress from clinical learning and exams [6-8]. Numerous studies, like one from Nepal shows that two-thirds of female medical students have PMS and more than one-third fit the criteria for PMDD, confirming the high incidence of these illnesses among healthcare students [3,6,8]. Although both PMS and perceived stress have been widely studied among female healthcare students, evidence examining their direct association in medical students remains limited. This study aimed to determine the prevalence of PMS and evaluate its association with perceived stress among medical students at a teaching hospital

MATERIALS AND METHODS

This analytical cross-sectional study was carried out in the physiology department of Chitwan Medical College's (CMC) basic science block between December 2024 and May 2025. The Institutional Review Committee granted the study ethical approval (CMC-IRC/081/082/113). Each subject freely gave their informed consent before being included in the study.

The study included female undergraduate medical and dental students in their first and second years. The study excluded students

who had irregular or atypical menstruation patterns or who were receiving hormonal therapy or mental health treatments at the time of data collection.

The correlation formula was used to determine sample size [9].

$$N = [(Z\alpha + Z\beta)/C]^2 + 3$$

Where,

For $\alpha = Z\alpha = 1.96$, the standard normal deviation

For $\beta = Z\beta = 0.8416$, the standard normal deviation

$$C = 0.5 * \ln[(1+r)/(1-r)] = 0.3361$$

where the Spearman correlation coefficient (r) is 0.324 [8].

The sample size that results from using all the values in the calculation is 72.

All eligible female first- and second-year medical and dental students aged 18–25 years, unmarried, with regular menstrual cycles (21–35 days, ≤ 7 -day inter-cycle variation), were listed and enrolled via Excel-based simple random sampling (lottery method) using roll numbers.

Three sections of a standardized self-administered questionnaire were used to gather data. The participants' data was collected via a Google form. Age, body mass index (BMI), blood pressure, academic program, year of study, age at menarche, menstrual cycle length, history of dysmenorrhea, and family history of premenstrual syndrome (PMS) were all included in the sociodemographic and menstrual history.

The Premenstrual Symptoms Screening Tool (PSST), which assesses luteal phase severity and classifies presentations into mild PMS,

moderate-to-severe PMS, or Premenstrual Dysphoric Disorder (PMDD) according to criteria established by the American College of Obstetricians and Gynecologists (ACOG), was used to assess PMS [2,10]. The Premenstrual Symptoms Screening Tool (PSST) converts DSM-IV criteria into a useful rating scale for physicians by classifying premenstrual disorders according to functional impairment and symptom severity. There are two parts to it:

Symptom Section: 14 items measuring typical premenstrual symptoms (physical, behavioral, and emotional). The first four of the fourteen questions are referred to as Core Symptoms (Q1-4).

Functional Impact Section: This section includes the final five items (Q15–19) that gauge how much these symptoms interfere with day-to-day activities (job, relationships, social activities, etc.). PMDD diagnosed if ≥ 1 severe (Q1-4) + ≥ 4 moderate/severe (Q1-14) + ≥ 1 severe (Q15-19). Moderate to Severe PMS if ≥ 1 moderate/severe (Q1-4) + ≥ 4 moderate/severe (Q1-14) + ≥ 1 moderate/severe (Q15-19). No/Mild PMS if it doesn't fit the requirements above

The 10-item Perceived Stress Scale (PSS-10), a validated tool with responses ranging from zero (never) to four (very often) and total scores ranging from zero to 40, was used to measure perceived stress [11,12]

Questions 1, 2, 3, 6, 9, and 10 have forward scores of 0=0, 1=1, 2=2, 3=3, and 4=4, while questions 4, 5, 7, and 8 have reverse values. Change the scores on these four questions to 0=4, 1=3, 2=2, 3=1, and 4=0. Low stress was defined as a score between 0 and 13. Moderate stress was defined as scores between 14 and 26. High perceived stress was defined as scores between 27 and 40.

Before being imported into SPSS Version 16 for the final statistical analysis, the data were retrieved from Google Forms using Microsoft Excel. Discrete categorical data were expressed using frequencies and percentages, whereas continuous variables were displayed as means and standard deviations. The stress and PMS categories were compared using the chi-square test, and Spearman's rho was applied to examine the relationship between overall stress and PMS score. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The study had 102 female students in total. Among them, 71.6% were MBBS students and 53.9% of the participants were in their first year of study. (Figure 1)

The participants' average age was $20.34 \pm$

1.60 years, and their average BMI was 22.74 ± 4.75 kg/m². (Table 1).

Table 1. Baseline clinical and menstrual profiles of the study Participants (n=102)

Parameters	Mean	Standard deviation
Age (years)	20.34	1.6
BMI (Kg/m ²)	22.74	4.75
Systolic BP (mm Hg)	112.79	9.44
Diastolic BP (mm Hg)	71.25	8.20
Age at Menarche (years)	12.66	1.14
Menstrual Cycle Length (days)	29.23	4.06

The average menstrual cycle duration was 29.23 ± 4.06 days, and the average age of menarche was 12.66 ± 1.14 years. (Table 1) 46.1% of individuals had dysmenorrhea, and 38.2% of students reported having a family history of PMS. (Figure 1) Overall, 18.6% (n =

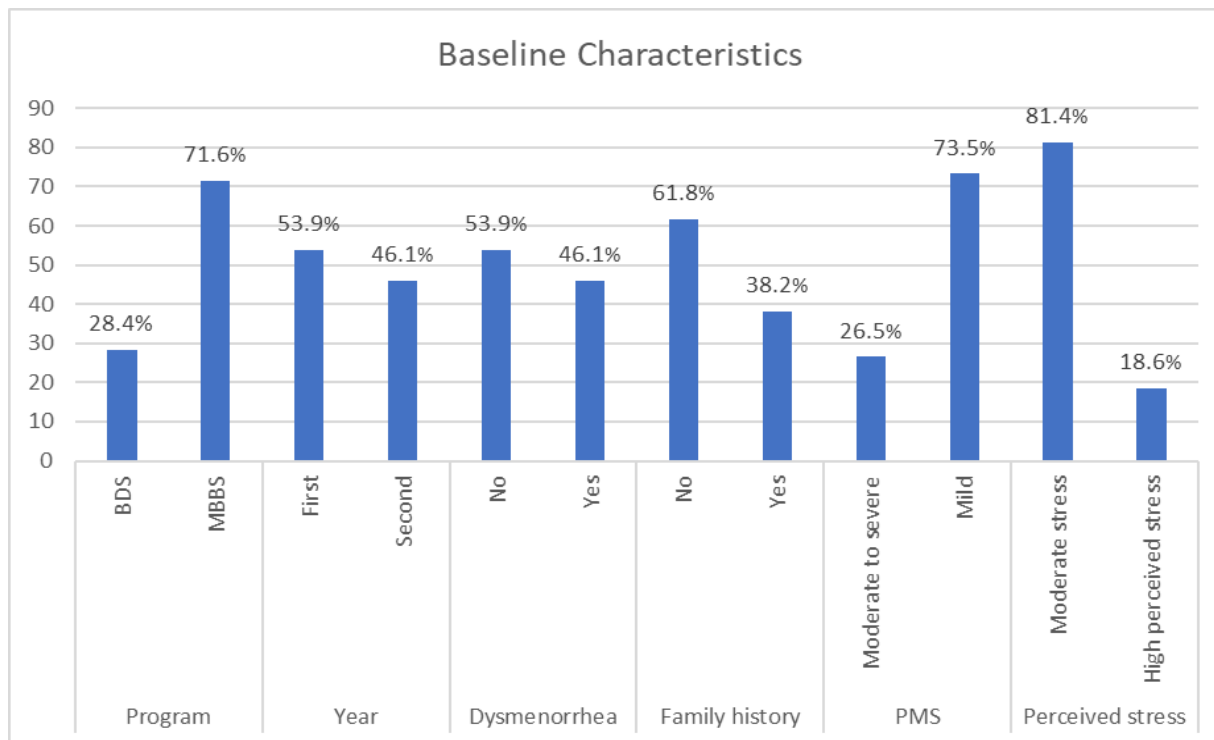


Figure 1: Distribution of baseline academic, clinical, and psychological characteristics among participants (n=102).

19) had high perceived stress (PSS-10 score > 27), and 26.5% (n = 27) had moderate-to-severe PMS. (Figure 1) Overall, 26.5% (n =

27) had moderate-to-severe PMS, and 18.6% (n = 19) had high perceived stress (PSS-10 score > 27) (Figure 1).

Table 2. Distribution of PMS Symptom Severity Among Participants (n=102)

Symptom Section		Not at all		Mild		Moderate		Severe	
		n	%	n	%	n	%	n	%
Anger/irritability		18	17.6	28	27.5	34	33.3	22	21.6
Anxiety/tension		24	23.5	31	30.4	29	28.4	18	17.6
Tearfulness/increased sensitivity to rejection		22	21.6	29	28.4	30	29.4	21	20.6
Depressed mood/hopelessness		28	27.5	33	32.4	17	16.7	24	23.5
Decreased interest in work, home, or social activities		21	20.6	27	26.5	30	29.4	24	23.5
Difficulty concentrating		19	18.6	33	32.4	33	32.4	17	16.7
Fatigue/lack of energy		18	17.6	25	24.5	33	32.4	24	23.5
Overeating/food cravings		25	24.5	24	23.5	26	25.5	27	26.5
Insomnia or hypersomnia		33	32.4	29	28.4	18	17.6	22	21.6
Feeling overwhelmed or out of control		32	31.4	26	25.5	20	19.6	24	23.5
Physical symptoms	Breast tenderness	33	32.4	22	21.6	17	16.7	30	29.4
	Headache	28	27.5	35	34.3	22	21.6	17	16.7
	Joint/muscle pain	26	25.5	30	29.4	21	20.6	25	24.5
	Bloating	30	29.4	28	27.5	23	22.5	21	20.6
Functional impairment									
Work efficiency or productivity		24	23.5	40	39.2	20	19.6	18	17.6
Relationship with coworkers		31	30.4	24	23.5	24	23.5	23	22.5
Relationship with family		34	33.3	28	27.5	22	21.6	18	17.6
Social life activities		22	21.6	34	33.3	24	23.5	22	21.6
Home responsibilities		28	27.5	33	32.4	21	20.6	20	19.6

Table 3. Response Distribution for Individual PSS-10 Items (n=102)

In the last month	Never		Almost never		Sometimes		Fairly often		Very often	
	n	%	n	%	n	%	n	%	n	%
How often have you been upset because of something that happened unexpectedly?	8	7.8	13	12.7	26	25.5	23	22.5	32	31.4
How often have you felt that you were unable to control the important things in your life?	16	15.7	16	15.7	32	31.4	20	19.6	18	17.6
How often have you felt nervous and stressed?	10	9.8	15	14.7	33	32.4	21	20.6	23	22.5
How often have you felt confident about your ability to handle your personal problems?	18	17.6	27	26.5	29	28.4	15	14.7	13	12.7
How often have you felt that things were going your way?	8	7.8	15	14.7	36	35.3	27	26.5	16	15.7
How often have you found that you could not cope with all the things that you had to do?	15	14.7	9	8.8	33	32.4	24	23.5	21	20.6
How often have you been able to control irritations in your life?	10	9.8	29	28.4	37	36.3	8	7.8	18	17.6
How often have you felt that you were on top of things?	12	11.8	12	11.8	30	29.4	20	19.6	28	27.5
How often have you been angered because of things that were outside of your control?	10	9.8	15	14.7	37	36.3	23	22.5	17	16.7
How often have you felt difficulties were piling up so high that you could not overcome them?	9	8.8	13	12.7	36	35.3	21	20.6	23	22.5

The most reported moderate-to-severe symptom among the 11 core DRSP symptom domains was anger/irritability (54.9%), followed by fatigue/lack of energy (55.9% moderate-to-severe combined) and trouble concentrating (49.1% combined moderate-to-severe). Breast tenderness was regarded as a severe physical symptom by 29.4% of respondents (Table 2). In all five domains, functional impairment was also often noted. Social life activities (55%) and relationships with coworkers (56%) were significantly noted under a combination of moderate to severe (Table 2).

The most common stressful experience, according to an analysis of individual PSS-10 items, was feeling disturbed "very often" due to an unexpected event (31.4%). (Table 3). Only 10.7% (n = 8) of students with mild or no PMS reported high stress, compared to 40.7% (n = 11) of students with moderate-to-severe PMS (Table 4). This difference was statistically significant ($p = 0.001$). Using Spearman rho, a statistically significant positive association was found between the diagnosis of premenstrual syndrome and overall stress levels ($r = 0.237$, $p = 0.013$).

with moderate-to-severe PMS reported high stress, which was statistically significant ($p = 0.001$). Our finding shows that students who have moderate-to-severe PMS are more likely to be under high stress (40.7%). Our findings align with the existing literature on the stress-PMS relationship in academic populations [10,13].

Three multilevel meta-analyses review which included 66 studies (N = 38,344) shows a correlation between stress and premenstrual symptoms ($r = 0.29$, 95% CI: 0.23–0.36) which is similar to our study ($p = 0.237$) [13]. However, our result is slightly less than the association ($p = 0.543$, $p < 0.001$) seen among Jordanian medical students [14]. This could be the result of cultural differences in how they perceive stress, different assessment techniques, or different levels of academic pressure.

A study conducted in the United States showed that women who felt high levels of stress were 7.2 times more likely to experience more PMS (OR = 7.2) when compared with women who felt low stress [15]. This finding is similar to our study which shows correlation between stress and

Table 4. Association Between PMS Category and Perceived Stress Level (n=102)

Perceived stress		Moderate stress	High perceived stress	p value
PMS	Moderate to severe	16 (59.3%)	11 (40.7%)	0.001
	Mild	67 (89.3%)	8 (10.7%)	

DISCUSSION

In our study, a positive correlation was seen between perceived stress and the severity of premenstrual syndrome (PMS) among medical and dental students (Spearman $\rho = 0.237$, $p = 0.013$). Among the study participants, 10.7% with mild PMS and 59.3%

PMS severity (59.3% vs. 10.7%). This result supports that stress is a strong predictor of PMS across different population.

A study done in Nepal showed that 64% of female medical students had PMS and 36.3% had PMDD. Out of which, 68.1% reported having trouble focusing on class, and 58.1%

skipped lectures because of menstrual symptoms [16]. These results were consistent with our study, which demonstrated that 37.2% of participants experienced moderate-to-severe functional impairment in job productivity.

The most prevalent symptoms in our study were anger/irritability (54.9% moderate-to-severe) and fatigue/lack of energy (55.9% moderate-to-severe). This outcome is in line with the global PMS studies, which found that the most common symptoms were connected to mood and energy [5,13]. Due to its direct impact on academic performance, the significant incidence of moderate-to-severe concentration difficulties (49.1%) is especially relatable to medical and dental students.

Our results on functional impairment are consistent with studies that indicate moderate-to-severe PMS/PMDD is linked to increased absenteeism and 3.12 times higher chances of impairment in work productivity [17]. Our study showed that 37.2% of participants had moderate-to-severe impairment in work efficiency/productivity and even higher impairment in coworker relationships (46.0%) which demonstrates the psychological impact of PMS in our participants.

There are numerous interrelated physiological and psychological factors that can explain the association between stress and PMS [5]. The hypothalamic-pituitary-adrenal (HPA) axis is activated by stress, which raises cortisol levels and further disrupts the hypothalamic-pituitary-ovarian (HPO) axis [5]. This will lead to different level in progesterone and estrogen throughout the luteal phase, which exacerbates PMS symptoms [5]. Stress also has an impact on

neurotransmitter systems, especially serotonin, which has an important role in controlling mood which leads to Mood swings, anxiety, irritability, and depression during the premenstrual phase [13]. These effects are made worse by stress [13]. Studies have shown that higher amygdala-frontal connection during the premenstrual period can be linked to higher stress perception and symptom severity in women with PMS [5,13].

During the premenstrual phase, women with PMS not only perceive high stress, but they also response to stressors more acutely which creates a vicious loop that makes both stress and PMS worse [18]. The association seen in our study may be explained by this bidirectional relationship.

A study shows that only 7.3% of Nepalese medical students with PMS seek medical consultation despite severe academic damage [16]. Hence, there is an urgent need for deeper insight and accessible support mechanisms for our students. Our study only included medical and dental students so, this might not be applicable for other female populations. Additionally, Self-reported measures are commonly used in this type of research, however they are prone to recall bias. In this study, a participant's mood or stress levels at the precise moment of survey completion may have an impact on retrospective reporting of PMS symptoms, thereby exaggerating the observed correlation.

CONCLUSIONS

Moderate-to-severe PMS was common among female medical and dental students and showed a statistically significant positive association with perceived stress. Longitudinal multicenter studies are

warranted to clarify temporal relationships and identify modifiable risk factors.

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