






# Premenstrual Syndrome and Its Association with Perceived Stress: The Experience of Medical Students in Jordan

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**Objective:** To assess the prevalence of premenstrual and menstrual symptoms and to investigate premenstrual severity's association with perceived stress of premenstrual syndrome among medical students.

**Methods:** This is a cross-sectional study. Data were collected between March and April 2021, a self-administered online questionnaire ([Supplementary Material](#)) was distributed to a sample of female medical students in Jordan (n=594).

**Results:** The mean age was 21.6 ± 2.2 years, and the mean body mass index (BMI) was 22.8 ± 4.1 kg/m<sup>2</sup>. Most students were in their 5th and 6th university year, where 75.4% reported having dysmenorrhea, 45.8% used pharmacological agents for pain relief, while 54.2% used non-pharmacological means, and 58.1% occasionally skipped lectures. Most participants reported a constellation of physical and psychological symptoms. The mean for the premenstrual severity scale score was 29.3, and the mean for the perceived stress scale scores was 21.6. There was a statistically significant correlation between the premenstrual severity scale score and the perceived stress scale, between the premenstrual severity scale and absenteeism, between premenstrual severity scale and year of study, and between dysmenorrhea and the perceived stress scale, but not between the severity of symptoms and method of pain relief.

**Conclusion:** Premenstrual and menstrual symptoms have a negative impact on students that affects their academic participation. More support should be given from universities to address the menstruation-related struggles of female students.

**Keywords:** premenstrual syndrome, premenstrual severity scale, perceived stress scale, medical students

## Introduction

Worldwide, around 1.8 billion women experience menstruation every month, which is regarded as a natural physiological process.<sup>1</sup> Currently, more recognition is being garnered regarding the fact that menstruation might have a negative effect on many individuals.<sup>2</sup>

Premenstrual syndrome (PMS) is a common gynaecological disorder with a pooled prevalence of 47.8%.<sup>3</sup> It usually presents with a constellation of physical and psychological symptoms. These symptoms include abdominal pain, back pain, headache, breast tenderness and swelling, nausea, constipation, irritability, anxiety, anger, fatigue, restlessness, mood swings, crying, change in appetite, and weight gain.<sup>4</sup>

The symptoms of PMS may lead to significant distress and impairment of function. Although premenstrual symptoms per se are experienced by about 90% of women, only around 20% experience symptoms severe enough to cause substantial impairment of daily life activities.<sup>5,6</sup> No consensus exists on how symptom severity should be assessed. This has resulted in the use of a wide variety of symptom scores and scales.<sup>7</sup>

Various studies have been conducted to assess the impact of menstrual symptoms on university students, knowing that stress and menstrual problems are the most common complaints amongst this age group.<sup>3,8</sup> Premenstrual syndrome has various effects on the emotional state and educational performance of students.<sup>9</sup> Understanding and improving the menstrual experience of university students may encourage structural changes in order for students to be sufficiently supported in dealing with their menstrual and learning needs.

Various studies have explored the prevalence of premenstrual symptoms amongst university students and have found a positive correlation between stress and PMS.<sup>10,11</sup>

Munro et al conducted a systemic review regarding the menstrual experience of university students and its effect on education. The review found that students' negative experience of menstruation can negatively impact their education, rate of absenteeism, concentration, interaction and academic participation.<sup>12</sup>

Another study by Al-Shahrani et al on medical students in Saudi Arabia reported that PMS had significant negative effect on their daily activities related to quality of life and homework.<sup>13</sup> Similarly, Nisar et al found that premenstrual syndrome has adverse effects on the educational performance and well-being of students.<sup>9</sup>

The effect of the menstrual experience on the psychological health and academic participation of university students in Jordan needs further exploration and expansion. This study aimed at assessing the prevalence of premenstrual and menstrual symptoms and their association with perceived stress among medical students in Jordan and exploring their effects on academic participation. Additionally, the study aimed to evaluate the relation between dysmenorrhea and perceived stress and to explore whether different pain relief methods affected the severity of the symptoms.

## Methods

### Study Design

A cross-sectional design was used to achieve the purpose of the current study.

### Sample and Sampling Technique

A convenient sampling technique was used to recruit a sample of 594 female medical students' who had agreed to participate in this study. The sample size was calculated based on the Jordanian female medical students' population size of 7000, with an error margin of 5% and a confidence interval of 95%. The minimum required sample size was 365 participants.

### Site and Setting of the Study

The class representatives from all universities in Jordan were asked to distribute the questionnaire ([Supplementary Material](#)) to female medical students in their universities.

### Measurement

Data were collected between March and April 2021. A self-administered online questionnaire ([Supplementary Material](#)) was distributed on Google Forms among social media platforms that specifically targeted female medical students in Jordan. The questionnaire used was adapted from previous literature<sup>13-15</sup> and was checked by four gynaecologists. A pilot study was conducted on 30 participants, the responses were then omitted from the final analysis. The Cronbach alpha was 0.78. The final copy of the questionnaire is attached.

The class representatives from all universities in Jordan were asked to distribute the questionnaire to female medical students. In addition, the questionnaire ([Supplementary Material](#)) was e-mailed to all current female medical students through their respective information and technology centres and was shared with medical students' groups. A short paragraph about the study was specified by a URL that was linked to the questionnaire. Once participants clicked the link, they were able to read provided information about the study and a consent to participate in the study. The emails of the researchers were included in case of any enquiries. The inclusion criteria were being a current female medical student, a current resident of Jordan, and being 18 years of age and above. The exclusion criteria were having any chronic illness, psychological disorder, uterine fibroids, endometriosis, and pelvic inflammatory disease (PID).

The self-administered questionnaires ([Supplementary Material](#)) covered a premenstrual severity scale (PMSS) that was composed of 21 variables and had scores of 0 for none, 1 for mild, 2 for moderate and 3 for severe. The total score was calculated by summing the 21 item scores. The questions used in the PMSS scale were reviewed by gynaecologists and a statistician, a pilot study was done to ensure its validity. The total scores of the PMSS scores obtained by participants in this study ranged from 31 to 63 points, where higher scores indicated more severe symptoms. The interquartile range was used to extract the cut-off point, where a score of  $\leq 22$  indicated mild symptoms, 23–36 indicated moderate symptoms, and  $\geq 37$  indicated severe symptoms. Participants were asked to rate their answers according to the last three menstrual cycles.

In addition, the perceived stress scale (PSS), a psychological instrument for measuring the perception of stress. It tests the degree to which situations in participant's life are appraised as stressful as it taps into unpredictable and uncontrollable situations in one's life.<sup>16</sup> The PSS scores were obtained by reversing responses (0 for 4, 1 for 3, 2 for 2, 3 for 1 and 4 for 0) for items 4, 5, 7 and 8, followed by a summing process. Scores between 0 and 13 indicated low, between 14 and 26 indicated moderate, and between 27 and 40 indicated high perceived levels of stress.

## Ethical Consideration

This study was approved by the Institutional Review Board of Jordan University of Science and Technology (JUST)/ King Abdullah University Hospital (KAUH) (35/137/2021). Participant consent was taken, and analysis was performed on de-identified data. Patient data privacy and confidentiality are maintained as this study was conducted in compliance with the ethical standards per Helsinki declaration.

## Statistical Analysis

For statistical analysis, SPSS IBM software version 25 was used. Categorical data were expressed in frequencies and percentages, and scale data were expressed by mean  $\pm$  SD. Pearson correlation was used to correlate scale variables. Spearman correlation was used for ordinal scale variables and point-biserial correlation was used to correlate nominal scale variables. Alpha level of  $< 0.05$  was considered as statistically significant.

## Results

Data collected from 594 participants who met inclusion criteria were analysed. The collected demographic data included university, age, year of study, marital status, residency, body mass index (BMI), and smoking status ([Table 1](#)).

The mean age of the 594 participants was  $21.6 \pm 2.2$  years, and the mean BMI was  $22.8 \pm 4.1$  kg/m<sup>2</sup>. The majority of participants, (55.6%) were students at Jordan University of Science and Technology (JUST), most of them were in their 5th and 6th year, 24.7% and 22.2% respectively, 98.2% were single, and 1.8% were either married or divorced. The majority of participants (98.2%) had no children, 83.3% were non-smokers, and 62% lived with their families while the rest lived away from home.

The mean age of participants' menarche was  $12.8 \pm 1.5$  years. The majority (81.6%) reported having 21–35 day cycle lengths, 82.5% reported having regular cycles, 96.1% of them reported that the duration of menstruation was 3 to 8 days, 97.5% reported using less than 7 pads per day, and 75.4% reported having dysmenorrhea, where 45.8% of them used pharmacological agents for pain relief, while 54.2% used non-pharmacological options ([Table 2](#)).

When asked about their educational performance in relation to menstruation, it was found that 58.1% occasionally skipped lectures. In addition, the majority of participants reported having moderate levels of pelvic pain, joint or muscle pain, breast tenderness, bloating, being overwhelmed or out of control, fatigue, irritability, anger, nervousness, depression, anxiety and mood swings.

Furthermore, most participants reported mild levels of headache, sleep disturbances, harder social interactions and difficulty concentrating, whereas the symptoms that were least reported were nausea, vomiting, constipation, diarrhoea, feeling worthless or guilty, palpitations, and paranoia ([Table 3](#)).

The mean for the PMSS score amongst participants was  $29.3 \pm 13.3$ , and the mean for PSS scores was  $21.6 \pm 5.5$  ([Table 4](#)).

**Table 1** Demographics of the Study Population of Female Medical Students

Parameter	N	%
Jordan University of science and Technology	330	55.6
The Hashemite University	36	6.1
Al-Balqaa' University	46	7.7
Al-Yarmouk University	69	11.6
Mutah University	113	19
1st year of study	48	8.1
2nd year of study	109	18.4
3rd year of study	76	12.8
4th year of study	82	13.8
5th year of study	147	24.7
6th year of study	132	22.2
Married/divorced	11	1.8
Single	583	98.2
Have children	7	1.2
No children	587	98.8
Smoker	99	16.7
Non-smoker	495	83.3
Dormitory	226	38
Home with family	368	62
Age (M ± SD)	21.6 ± 2.2	
BMI (M ± SD)	22.8 ± 4.1	

There was a statistically significant correlation between the PMSS and the PSS scale ( $\rho=0.543$ ,  $p\leq 0.001$ ,  $N=594$ ), indicating that the score of the PMSS scale goes up as the level of stress increases (Table 4).

There was a statistically significant correlation between the PMSS and skipping of lectures ( $\rho=0.337$ ,  $p\leq 0.001$ ,  $N=594$ ) indicating that where there is an increase in the score of the PMSS scale, there would be an increase in absenteeism (Table 5).

There was no statistically significant correlation between the severity of symptoms and method of pain relief, pharmacological or non-pharmacological, as revealed by point-biserial analysis ( $r_{pb} = -0.033$ ,  $p=0.416$ ,  $N=594$ ) (Table 5).

There was a statistically significant negative correlation between PMSS scale and the year of study ( $\rho = -0.133$ ,  $p\leq 0.001$ ,  $N=594$ ), indicating that female students in the lower years of university were more likely to have a high score of symptom severity (Table 5).

The point-biserial correlation revealed that there was a statistically significant correlation between dysmenorrhea and PSS ( $r_{pb} = 0.185$ ,  $p\leq 0.001$ ,  $N=594$ ), indicating that high-stress scores are associated with the presence of dysmenorrhea (Table 6).

## Discussion

Stress and menstrual problems are among the most common health issues that female students encounter.<sup>3,8,17,18</sup> Women are said to have PMS if they complain of recurring physical and/or psychological symptoms that occur throughout the

**Table 2** Characteristics of the Menstrual Cycle and Absenteeism During Menstruation of Female Medical Students

Characteristic	Estimate
Cycle length	
<21 days	50 (8.4)
21–35 days	485 (81.6)
>35 days	59 (9.9)
Cycle regularity	
Regular (same date each month $\pm 5$ days)	490 (82.5)
Irregular	104 (17.5)
Duration of menstruation	
$\leq 2$ days	5 (0.8)
3–8 days	571 (96.1)
$\geq 9$ days	18 (3.0)
Blood loss	
Less than 7 pads per day without clots	472 (97.5)
Abundant (more than 7 pads per day) or passage of clots	122 (20.5)
Dysmenorrhea	
Yes	448 (75.4)
No	146 (24.6)
Pain relief method	
Pharmacological	272 (45.8)
Non-pharmacological	322 (54.2)
Skipping lectures	
Sometimes	345 (58.1)
Never	125 (21.0)
Always	124 (20.9)
Age at menarche (years)—mean (SD)	12.8 (1.5)

luteal phase of the menstrual cycle which cease with the resolution of menstruation.<sup>7</sup> The severity of these symptoms varies between individuals.<sup>5</sup> This study highlighted that pelvic pain, fatigue, irritability, and nervousness are the most commonly reported PMS physiological changes that underlie its pathophysiology. This is consistent with the findings of other studies.<sup>9,19</sup>

It is hypothesised that the cause of premenstrual symptoms is due to abnormal function of the hypothalamus-pituitary-adrenal axis, aberrant hormonal fluctuations, dietary factors, and other lifestyle factors.<sup>4</sup> In addition, changes in the oestrogen, progesterone and serotonin levels at the beginning of the menstrual cycle have been associated with PMS. Neuroendocrine fluctuations in these hormone levels can cause mood swings, anxiety, irritability and many other symptoms.<sup>15</sup>

Female medical students who participated in this study were found to have moderate levels of both PMSS and PSS. Additionally, a positive correlation between the PMSS score and PSS was evident. These findings are consistent with the findings of other studies where severe premenstrual and menstrual symptoms correlated with higher levels of stress.<sup>10,11</sup>

Rafique et al found that menstrual disorders were strongly associated with stress amongst female university students, where students who score  $>27$  on the PSS show a strong positive correlation with premenstrual symptoms.<sup>20</sup> Another study by Ekpenyong et al demonstrated a significant association between academic stress and menstrual disorders among university students.<sup>21</sup>

Furthermore, Gollenberg et al garnered similar results, where PSS scores positively correlated with increased symptom severity scores for premenstrual symptoms amongst women.<sup>14</sup>

The academic participation of female university students may be negatively impacted by their menstrual experience.<sup>10</sup> This study found a positive correlation between skipping lectures due to menstrual symptoms and the PMSS score. This finding may reflect that the students were unable to function at full capacity due to the effects of menstruation which may

**Table 3** Premenstrual Symptoms of the Study Population of Female Medical Students

Symptom	Severity—n (%)			
	None	Mild	Moderate	Severe
Pelvic pain	80 (13.5)	160 (26.9)	212 (35.7)	142 (23.9)
Headache	197 (33.2)	211 (35.5)	135 (22.7)	51 (8.6)
Joint or muscle pain	106 (17.8)	178 (30.0)	217 (36.5)	93 (15.7)
Breast tenderness	136 (22.9)	178 (31.5)	204 (34.3)	67 (11.3)
Bloating	123 (20.7)	172 (29.0)	203 (34.2)	96 (16.2)
Nausea & vomiting	334 (56.2)	155 (26.1)	83 (14.0)	22 (3.7)
Constipation	328 (55.2)	160 (26.9)	70 (11.8)	36 (6.1)
Diarrhoea	243 (40.9)	185 (31.1)	140 (23.6)	26 (4.4)
Sleep disturbances (slept more or had insomnia)	137 (23.1)	171 (28.8)	166 (27.9)	120 (20.2)
Felt overwhelmed or out of control	112 (18.9)	151 (25.4)	187 (31.5)	144 (24.2)
Felt worthless or guilty	174 (29.3)	164 (27.6)	137 (23.1)	119 (20.0)
Social interactions became harder	116 (19.5)	175 (29.5)	166 (27.9)	137 (23.1)
Fatigue	58 (9.8)	140 (23.6)	218 (36.7)	178 (30.0)
Irritability or angry	56 (9.4)	139 (23.4)	211 (35.5)	188 (31.6)
Nervousness	71 (1.2)	144 (24.2)	208 (35.0)	171 (28.8)
Felt depressed, sad or blue	60 (10.1)	147 (24.7)	209 (35.2)	178 (30.0)
Anxiety	84 (14.1)	167 (28.1)	213 (35.9)	130 (21.9)
Had mood swings (suddenly sad or tearful)	62 (10.4)	122 (20.5)	206 (34.7)	204 (34.3)
Difficulty concentrating	106 (17.8)	199 (33.6)	159 (26.8)	130 (21.9)
Palpitations	279 (47.0)	174 (29.3)	105 (17.7)	36 (6.1)
Paranoia (feelings of persecution or mistrust)	325 (54.7)	156 (26.3)	76 (12.8)	37 (6.2)

**Table 4** Correlation Between PMSS and PSS in Female Medical Students (n=594)

	Mean (SD)	r	p value
PMSS	29.3 (13.3)	0.543	0.001
PSS	21.6 (5.5)		

**Table 5** Correlation of PMSS with Skipping Lectures, Pain Relief, and Years of Study (N=594)

Variables	Correlation	p value
Skipping lectures	0.337 <sup>a</sup>	0.001
Pain relief	-0.033 <sup>b</sup>	0.416
Years of study	0.133 <sup>a</sup>	rho= -0.133 <sup>a</sup> p-value=0.001

Notes: <sup>a</sup>Spearman's rho. <sup>b</sup>Point-biserial correlation.

**Table 6** Correlation Between PSS and Dysmenorrhea N=594

Variables	PSS
Dysmenorrhea	r <sub>pb</sub> = 0.185 <sup>b</sup> P-value=0.001

Note: <sup>b</sup>Point-biserial correlation.

be related to the physical and emotional symptoms they experience. Henceforth, it is clear that female students are in dire need of academic and psychological support at times of menstruation. This could be achieved through a multi-disciplinary support team which students can access through university services.

In line with these findings, a systemic review of the menstrual experiences of university students, and the impact on their education, found that students with more severe menstrual symptoms had greater rates of absenteeism before or at the time of menstruation.<sup>12</sup>

Many other studies have reported that the severity of PMS symptoms impedes normal day-to-day activities and has a significant effect on the quality of life and academic participation amongst university students.<sup>13,22</sup>

Symptom relief methods were also examined in this study. Participants had used either pharmacological agents in the form of antidepressants, analgesics, oral contraceptives, or non-pharmacological agents in the form of diet, lifestyle changes, exercise, limiting caffeine intake, nutritional supplements, and herbal remedies. No significant correlation was found between the choice of pain relief method and the PMSS score. This could be explained by the usage of pharmacological pain relief methods by students with less severe symptoms, which led to there being no difference between the two groups.

A combination of both non-pharmacological and pharmacological treatment has been proven to be most beneficial.<sup>4</sup> Some studies advised reverting to pharmacological treatment only when conservative measures fail or when symptoms are too severe.<sup>23-25</sup>

Students in earlier years of medical school were found to have higher PMSS scores, this may be attributed to the fact that they still have not habituated to university and have not yet developed coping strategies to deal with menstrual effects in their university life and education. Perhaps, confirmatory studies could explore this issue further.

Dysmenorrhea is defined as chronic pain, spasmodic in nature that occurs right before or during menstruation. In this study, 75% of participants reported having dysmenorrhea. The prevalence of dysmenorrhea in other studies ranged between 53% and 89%.<sup>13,20,26</sup> The worldwide estimated prevalence is between 66.6–75.2%.<sup>27</sup>

This study found a significant correlation between dysmenorrhea and the PSS score, indicating that students who reported dysmenorrhea claimed higher levels of perceived stress. This is consistent with the results of other studies that have found an association between stress and dysmenorrhea.<sup>12,27</sup> Addressing the effect of dysmenorrhea on students is a step in the right direction as it is the most significant premenstrual and menstrual symptom that contributes to both absenteeism and impaired academic performance.<sup>12,27</sup>

## Strengths, Limitations, and Implications

This study addresses the topic of the effect of menstruation on students which is often overlooked and not acknowledged, causing many female students to suffer the consequences without adequate support. However, the study had some limitations that include the opportunistic sampling approach, the heterogeneity of the sample and the lack of test-retest assessment of reliability, thus generalizability is not warranted. Additional population-based studies in various settings on the psychometric aspects of the premenstrual syndrome should be carefully designed and performed.

In addition, this study was conducted during the COVID-19 pandemic with its significant somatic and psychological impact on perceived stress on the study population. It is difficult to discern what could be the relation of perceived stress with the symptoms of PMS and the socio-environmental conditions caused by the pandemic.

A recent study on the relationship between dysmenorrhea, PMS, reproductive tract health and COVID-19-related anxiety, depression, and stress among 385 medical students in Jordan, 49.9% reported severe dysmenorrhea during COVID-19 compared to 36.9% before COVID-19. Dysmenorrhea was significantly associated with disruptions of sport and daily activities during COVID-19. Premenstrual Syndrome associated mastalgia, fatigue, headache, palpitation, emotional and sleep disturbances were worse during COVID-19 pandemic compared to the dates preceding it.<sup>28</sup>

A future research recommendation would be to carry out similar research on the general population of university students and school students to explore the generalisability of the results.

We hope the findings of this study will encourage universities to provide support for the educational and menstrual needs of female students and embrace the student's struggles. This can be done through the implementation of multi-disciplinary teams which the students can approach for support.

## Conclusion

The vast majority of participants reported having dysmenorrhea. High stress scores are associated with the presence of dysmenorrhea. Correlation between PMSS and PSS scales indicate that as the score of PMSS scale goes up the level of stress increases with a significant decrease in academic participation. Premenstrual and menstrual symptoms have a negative impact on students.

This study provides a step forward towards comprehending the menstrual experience of female university students in Jordan.

## Data Sharing Statement

All the data and materials used in this paper will be available from the corresponding author upon reasonable request.

## Ethical Approval and Consent to Participate

Participant consent was taken, IRB (35/137/2021).

## Consent for Publication

The authors report that this manuscript has not been submitted to any other journal for publication.

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## Author Contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

## Disclosure

All authors declare no conflicts of interest.

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