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Predictors of Premenstrual Syndrome Symptoms among Medical Students: A Cross-Sectional Study Investigating Health-Promoting Lifestyles

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ABSTRACT

Background & Objective: Premenstrual syndrome (PMS) is a prevalent issue affecting females of all ages, significantly impacting their quality of life and social well-being. The aim of this study was to investigate the relationship between health-promoting lifestyle components and PMS symptoms among Iranian medical students.

Materials & Methods: A cross-sectional study was conducted using cluster random sampling. The study sample consisted of a total of 144 medical students studying at a prestigious medical science university in Iran. Data were collected using a demographic and menstrual characteristics checklist, a premenstrual syndrome symptom questionnaire (PSQ), and a health promoting lifestyle profile (HPLP). Data were analyzed using a multiple linear regression model at a significance level of 0.05.

Results: The mean score for PMS symptoms was 34.55 (SD = 8.64), while the mean score for healthy lifestyle was 117 (SD = 21.32). The most common PMS symptoms were food cravings (56.9%) and sleep disturbances (49.3%). According to the results of single and multiple linear regression analyses, stress management (β=-0.216, p=0.034) and self-actualization (β=-0.288, p=0.016) had the most significant effect on PSQ, explaining approximately 16% of the variance in PMS symptoms.

Conclusion: Based on these findings, self-actualization and stress management were related to PMS symptoms. Improving health-promoting lifestyle behaviors, especially in the mental dimension, may also help alleviate PMS symptoms in students.

Keywords: Premenstrual Syndrome, Health Promotion, Lifestyle, Students

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1. Introduction

Premenstrual syndrome (PMS) a commonly experienced condition among women refers to a range of distressing symptoms that occur before the onset of menstruation. These symptoms, both physical and psychological in nature, are not associated with any underlying medical condition **(1)**. Research indicates that a significant majority, approximately 75%, of women in their reproductive years' experience symptoms associated with PMS **(2)**. However, the percentage of women worldwide who report experiencing severe symptoms is relatively low, ranging from 3% to 8% **(3)**. It is worth noting that the prevalence of severe PMS varies across different regions, with notable disparities observed among Asian, African, European, and South American women. For instance, 46% of Asian women, 85% of African women, 40% of European women, and 60% of South American women have reported experiencing severe PMS. In Iran, the highest prevalence rate of 98% has been documented. Studies conducted in Iran have specifically identified Tehran, Ilam, and Sanandaj as cities with a higher prevalence of PMS symptoms **(4)**.

Today, improving women's health is a crucial objective and a vital catalyst for social and economic development **(5)**. PMS is a psychosomatic problem related to women's reproductive performance, which occurs at the end of the luteal phase of the menstrual cycle and affects women's daily performance and significantly disrupts their quality of life **(6, 7)**. The severity of this syndrome varies among women, influenced by hormonal, psychological, and physiological factors **(8)**. PMS can result in decreased

productivity at work, diminished health-related quality of life, interference with interpersonal relationships and daily activities, and an increased risk of hypertension **(9)**. Notably, university students are particularly susceptible to PMS, with a high prevalence observed within this demographic **(10)**. During their college years, students undergo significant changes in their outlook on life, rendering them more vulnerable to mental health issues. More likely to have mental health problems **(11)**. According to a comprehensive meta-analysis conducted in Asia, it was found that 59% of high school students and 50.3% of university students reported experiencing **(12)**. The prevalence of PMS symptoms among students can have detrimental effects on various aspects of their lives, including academic performance, attendance, physical activity participation, and overall social well-being **(13)**.

Identifying the factors that influence PMS is crucial for developing effective strategies to prevent its symptoms. Numerous demographic, physiological, and sociological factors have been found to contribute to the control of PMS. Factors such as age, level of education, and socio-economic status have been shown to influence the incidence of PMS **(14)**. Additionally, unstable and challenging economic, political, and social environments can have a detrimental impact on women's physical and mental health **(15)**, leading to a decline in health during the menstrual cycle **(16)**. Moreover, physiological factors, including menstrual characteristics and obesity, have been found to be associated with PMS. Early menstruation (before the age of 12), painful periods, heavy bleeding, and bloating have been identified as potential risk factors for developing PMS (17).

Maintaining a healthy lifestyle is crucial for an individual's overall well-being. Lifestyles encompass the regular daily activities that individuals incorporate into their lives, and these activities significantly impact their health **(18)**. A healthy lifestyle has six dimensions: self-actualization, health responsibility, physical activity, diet, interpersonal support, and stress management **(19)**.

Currently, there exists limited and conflicting evidence regarding the correlation between certain lifestyle-related behaviors and PMS **(11)**. However, numerous studies have demonstrated that engaging in regular exercise can alleviate premenstrual symptoms and decrease the occurrence of PMS **(20, 21)**. Conversely, other studies have found no association between exercise and PMS **(22, 23)**. Additionally, a study conducted in Japan revealed that dietary habits influenced PMS in high school students **(24)**. However, a study conducted in India found no statistically significant association between diet and PMS **(25)**. Furthermore, a Polish study involving 476 women discovered that women with a body mass index (BMI) of less than 25 kg/m² were twice as likely to experience PMS compared to women with a BMI of ≥25 (kg/m²) **(26)**. Moreover, a study conducted by Bertone-Johnson et al. demonstrated that women with a BMI ≥27.5 (kg/m²) faced a higher risk of experiencing PMS symptoms **(27)**.

In order to better understand the relationship between lifestyle factors and PMS, it is crucial to identify key factors and propose potential preventive measures **(8)**. However, there is a significant lack of research on the correlation between healthy lifestyle behaviors and PMS in female students and Iranian women as a whole. Therefore, the objective of this study was to examine the lifestyle factors that are linked to premenstrual syndrome (PMS) among Medical Sciences students.

2. Materials and Methods

The study was a cross-sectional survey conducted from July to December 2022 among 144 students enrolled in the Faculties of Nursing and Midwifery, Paramedicine, and Medicine at a University of Medical Sciences in Iran. Participants were required to be between the ages of 18 and 25 and free of chronic diseases such as respiratory, renal, cardiac, diabetes, hypertension, asthma, headache, migraine, thyroid disorders, anemia, or nervous and mental disorders. They were also not allowed to be taking continuous medication like antihypertensive, antidepressant, antihistamine, hormone (21-35 days), or have a bleeding duration of 3–10 days. Exclusion criteria for the study included unwillingness to participate, pregnancy during the study, and experiencing a stressful event during the study period.

The data collection tool was a questionnaire on demographic and educational characteristics that included age, marital status, academic semester, field of study, academic year, employment status, and smoking history and Body Mass Index (BMI). It also included Walker's questionnaire on health-promoting lifestyle behaviors and a questionnaire on pre-existing symptoms from menstruation.

The Walker's Health-Promoting Lifestyle Scale is a comprehensive tool designed to assess health-promoting behaviors across six dimensions: diet, exercise, responsibility for health, stress management, interpersonal support, and self-actualization. This questionnaire consists of 49 questions, each utilizing a Likert-type response range. Within each question, respondents are given four options to choose from: "never" (worth 1 point), "sometimes" (worth 2 points), "often" (worth 3 points), and "always" (worth 4 points). By summing the scores of the questions related to each dimension, as well as the scores of all questions, a total score for the questionnaire can be obtained **(19)**. In 2010, Mohamadian et al **(28)** confirmed the validity of the questionnaire. Its reliability was reported to be 0.93 using the Cronbach's alpha coefficient method.

The Premenstrual Symptoms Questionnaire (PSQ) was employed as a tool to evaluate premenstrual symptoms, building upon its successful utilization in previous research studies **(29, 30)**. This comprehensive

questionnaire encompasses a series of inquiries designed to capture the presence of premenstrual symptoms experienced during the week preceding the menstrual cycle, which subsequently subside a few days after its onset. These inquiries align with the 11 symptoms outlined in the DSM and PMDD diagnostic criteria. Moreover, the PSQ delves into the impact of these symptoms on various aspects of an individual's life, including work efficiency, productivity, household responsibilities, social activities, and relationships with both colleagues and family members. The severity of premenstrual symptoms and their impact on social activities are rated on a 4-point scale (1: not at all; 2: mild; 3: moderate; and 4: severe). The total PSQ score is calculated by summing up all 14 items, resulting in a score range of 14 to 56. The reliability and validity of the PSQ have been thoroughly assessed and confirmed by Takeda et al **(31)**.

Sampling was conducted after obtaining approval from the Ethics Committee of Qom University of Medical Sciences and the respected officials of the faculties. To adhere to ethical standards, the questionnaires were collected anonymously. Researchers distributed the questionnaires among students by being present in the research environment and presenting an informed consent form. They also informed the participants about the study's objectives, emphasized the voluntary nature of participation, and assured the confidentiality of their identity information. The completed questionnaires were then collected by the researchers.

Statistical Analysis

The statistical software SPSS version 23 (IBM, USA) was utilized for data analysis. Descriptive statistics were used to explore the data. Independent t-test, one-way analysis of variance was used for comparison. A Pearson correlation coefficient was computed to assess the relationship between the dimensions of Health-Promoting Lifestyle and PSQ. Finally, a multiple linear regression test was conducted to predict the lifestyle factors of PMS, with a significance level of 5%.

3. Results

Table 1 presents the baseline characteristics of the participants. The mean age at study entry was 21.62 years, and the mean age at first menstruation was 12.97 years. Approximately half of the participants were studying paramedical subjects. Most of the participants had a normal BMI, and more than half reported consuming caffeine more than once a month. Most participants reported never having smoked.

Table 2 shows the health-promoting behaviors of the participants in the study. The average score on the Health-Promoting Lifestyle Scale for students was 117.10 out of a potential range of 49 to 196. This indicates that, on average, these students engage in health-promoting behaviors at a moderate frequency. The highest frequency was related to physical activity, with 34% of the average score of the maximum score, while acquired had the lowest frequency. The average score for PMS symptoms was 34.55 (standard deviation = 8.64) out of a possible range of 14 to 56. The most commonly reported symptom was the desire to eat, with 56.9% of participants experiencing it, while the least reported symptom was depressed mood, with only 20.8% of participants reporting it.

The correlation between different dimensions of health-promoting lifestyle and premenstrual syndrome symptoms is shown in Table 3. A significant negative correlation was observed between stress management, self-actualization and nutrition with PSQ.

The results of the regression model on the relationship between health-promoting lifestyle dimensions and premenstrual syndrome symptoms showed that self-actualization (β=-0.288, p=0.016) and stress management (β=-0.216, p=0.034) had a significant negative relationship with premenstrual syndrome symptoms. Therefore, participants with higher self-actualization and management scores had lower severity of menstrual syndrome symptoms. Table 3 shows the results of the multiple regression models of premenstrual syndrome symptoms based on health-promoting lifestyle variables (Table 4).

Table 1. Demographic Characteristics of Study Participants (n=144)

Variables	Number (%)/ mean (± SD)
Age (years)	21.62 (4.53)
Age at First Menstruation (years)	12.97 (1.39)
Body Mass Index	22.29 (3.51)
Marital Status	
Single	132 (91.7)
Married	11 (6.7)
Divorced	1 (7.0)
Educational Field	
Medicine	36 (25.0)

Variables	Number (%)/ mean (± SD)
Paramedicine	69 (47.9)
Nursing	16 (11.1)
Midwifery	16 (11.1)
Other	7 (4.9)
Academic Year	
First	23 (16.0)
Second	33 (22.9)
Third	46 (31.9)
Fourth	35 (24.3)
Other	6 (4.2)
Employment Status	
Employed	15 (10.4)
Unemployed	129 (89.6)
History of Smoking	
Yes	9 (6.3)
No	135 (93.7)

Table 2. Descriptive statistics of Health-Promoting Behavior and Premenstrual Syndrome Symptoms variables

Variables	mean (± SD)	Possible Range	Percentage [a]
Self-actualization	46.26 (54.5)	10-40	8.54%
Responsibility	35.27 (83.6)	12-46	1.45%
Interpersonal support	19.21(43.4)	8-32	9.54%
Stress Management	36.11 (46.2)	5-20	4.42%
Physical Activity	29.14 (77.4)	7-28	7.34%
Nutrition	38.16 (34.3)	7-28	6.44%
Health-Promoting Behaviors	117 (21.32)	49-196	46.20%
Premenstrual Syndrome Symptoms	34.55 (8.64)	14-56	48.80%

[a] The average percentage of the maximum score is determined by subtracting the average score from the lowest score in consideration. This difference is then divided by the range between the maximum and minimum scores being considered, and the result is multiplied by 100.

Table 3. Pearson correlations between health-promoting behaviors constructs and Premenstrual Syndrome Symptoms

Symptoms	r	p-value
Self-actualization	-0.304	0.001
Responsibility	0.014	0.871
Interpersonal support	-0.075	0.380
Stress Management	-0.231	0.006
Physical Activity	-0.061	0.476
Nutrition	-0.214	0.011

Table 4. Predictors of the Premenstrual Syndrome Symptoms based on multiple regression Modeling

Study Variables	Regression Coefficient	Standard Error	Beta	95% Confidence Interval	p-value
Constant	23.36	2.16		[19.090, 27.649]	<0.001
Self-actualization	-0.146	0.060	-0.288	[-0.264, -0.027]	0.016
Responsibility	0.082	0.047	0.171	[-0.011, 0.175]	0.083
Interpersonal Relationships	0.087	0.075	0.116	[-0.062, 0.236]	0.250
Stress Management	-0.299	0.139	-0.216	[-0.574, -0.024]	0.034
Physical Activity	0.034	0.064	0.049	[-0.094, 0.161]	0.601

4. Discussion

The present study showed that self-actualization and stress management were negative predictors of PMS symptoms. Previous studies have reported a relationship between stress and PMS in women **(32-34)**. According to a study, stress management plays a crucial role in preventing and managing PMS **(35)**. Other research findings indicate that incorporating yoga interventions as a psychological approach can effectively regulate stress levels and significantly alleviate the severity of PMS **(36)**. Effective stress management strategies appear to be associated with reduced PMS symptom severity, highlighting the importance of psychosocial factors in the PMS experience. Indeed, stress management techniques modulate hormonal responses, immune system function, and neurotransmitter activity, all of which may influence PMS symptoms **(37)**. Longitudinal studies and experimental designs may clarify the causal nature of this relationship and provide insight into potential intervention strategies.

Furthermore, self-actualization emerged as a significant predictor of adverse premenstrual syndrome (PMS) symptoms. These findings align with the research conducted by Alimoradi in Iran **(38)**. Self-actualization requires a positive outlook on life and a focus on personal growth. This optimistic view may influence the cognitive appraisal of PMS symptoms and lead to reduced anxiety associated with PMS symptoms. Individuals with high levels of self-efficacy may be more likely to adopt a proactive, problem-solving approach to managing their symptoms **(39)**, which may reduce the perceived severity of PMS symptoms.

The findings of our study indicate that nutrition does not play a significant role in predicting PMS symptoms. This contradicts a recent study conducted in Iran **(2)**, which demonstrated that PMS symptoms worsened with the consumption of a high-salt, high-sugar, or mixed western diet. It appears that imbalances in hormones and neurotransmitters can impact the metabolism of proteins, carbohydrates, and fats. Additionally, certain foods, such as vegetables and low-fat, high-fiber diets, have been found to lower plasma estrogen levels and reduce the duration of PMS symptoms. Further research is required to establish a clearer understanding of the relationship between diet and the exacerbation of psychological and physical symptoms linked to PMS.

The results of this study showed that physical activity was not a significant predictor of PMS symptoms. The results of recent studies that have examined the relationship between physical activity and PMS symptoms have shown that even regular, moderate physical activity can reduce the severity of PMS symptoms **(11, 32, 40)**. Possible reasons for the difference in results between our study and previous studies include the fact that the questionnaire used in the study measured physical activity in general (not using a specific physical activity questionnaire).

More than half (about 56%) of the women in the study reported binge-eating. Consistent with this study, previous studies have found that women with moderate or severe premenstrual syndrome (PMS) symptoms consume more calories and have more food cravings in the premenstrual phase than in the follicular phase **(41, 42)**. In addition, increased cravings for sweet, fatty, and salty foods such as fast food, chocolate, sweets, and desserts have been observed in women with PMS **(43)**. Insomnia or hypersomnia was the second most common PMS-related symptom reported by almost half of the students surveyed. Several factors may contribute to the high prevalence of insomnia or hypersomnia in students with PMS, including hormonal fluctuations such as decreased levels of estrogen and progesterone in the luteal phase, which may affect the regulation of the sleep-wake cycle and the neurotransmitter systems involved in sleep regulation **(44)**. The results of this study showed that depression was the least common PMS symptom. In a study of Turkish students by Özlem Akın et al., the prevalence of depression among PMS symptoms was almost 80%. One possible reason for this difference in results is that the study by Özlem Akın et al. was conducted during the outbreak of Covid-19.

The results of the present study showed that the health-promoting behaviors of the students were not at an optimal level, which is consistent with previous studies conducted in the Iranian population **(45, 46)**. The results of this study showed that interpersonal support and self-actualization had the highest score

among the dimensions of health-promoting behavior in medical students, while physical activity had the lowest score. These results are consistent with recent studies **(47-49)**. In previous studies, lack of time, inadequate facilities, or lack of will were the most common excuses given by students for avoiding exercise **(50, 51)**. A high score for interpersonal support has implications for patient care. Medical students who value and prioritize interpersonal relationships may be better equipped to communicate effectively with patients, leading to improved patient satisfaction and health outcomes.

This study had some limitations. Due to the cross-sectional nature of the study, it was not possible to establish a causal relationship between health-promoting behaviors and PMS symptoms. In addition, self-report psychometric scales were used to assess the variables in this study, which were not able to objectively assess diet and exercise status. Furthermore, the small sample size and the fact that the study was conducted at one university reduce the generalizability of the results.

5. Conclusion

According to the results of this study, self-actualization and stress management are related to PMS symptoms. Therefore, it seems that interventions that consider health-promoting lifestyle behaviors may be useful in managing the symptoms of premenstrual syndrome in college girls. In this regard, it is suggested that further studies be designed to evaluate the effectiveness of improving health-promoting lifestyle behaviors on PMS symptoms.

6. Declarations

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Ethical Considerations

The research followed the tenets of the declaration of Helsinki, and approval to conduct the study was obtained from the Medical Ethics Committee at Qom University of Medical Sciences (registration number: IR.MUQ.REC.1401.038). Written informed consent was obtained from the participants before inclusion into the study. All participants were free to withdraw from the study.

Authors' Contributions

Mina Razavi-Dinani was the main investigator, designed the study and collected the data. Zahra Saboohi wrote the first draft. Zahra Taheri-Kharameh was the study supervisor and contributed to the writing process and analysis. Fatemeh Sheikholeslami-Kabiri and Zahra Asgarian-Moghadam collected the data. All authors provided the final manuscript and approved the paper.

Conflict of Interest

The authors declare that they have no conflict of interests.

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