

Prevalence of Premenstrual Syndrome and Its Related Factors among Medical University Students

Mozhdeh Amirimoghadam (MD)¹, Mohammad Zaman Kamkar (MD)^{2*}, Zolaykha Karamelahi (MSc)^{3,4}

¹ Medical Student, Golestan Research Center of Psychiatry, Faculty of Medicine Golestan University of Medical Sciences, Gorgan, Iran

² Associate Professor of Psychiatry, Department of Psychiatry, Golestan Research Center of Psychiatry, Golestan University of Medical Sciences, Gorgan, Iran

³ MSc of Midwifery, Clinical Research Development Unit Sazar Hospital, Golestan University of Medical Sciences, Gorgan, Iran

⁴ PhD Student of Reproductive Health, Infertility and Reproductive Health Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, Iran

ARTICLE INFO	ABSTRACT
Article type: Original article	Background & aim: Premenstrual syndrome (PMS) refers to a periodic recurrence of a combination of physical, psychological and behavioral changes in the pauses of the menstrual cycle that can disrupt one's functioning and communication. The present study was performed to evaluate the prevalence of PMS and its related factors among university students.
Article History: Received: 04-Nov-2023 Accepted: 18-Aug-2024	Methods: This Cross-sectional study was conducted on 450 female students of different faculties of Golestan University of Medical Sciences, Golestan, Iran in 2021. The data were collected using the demographic characteristics questionnaire and menstrual symptom assessment questionnaire (PSST) on a self-report basis. Data were analyzed by SPSS software version 16 using Chi-square, independent T and Mann-Whitney tests.
Key words: Premenstrual Syndrome Prevalence Students	Results: In this study, 68% of students had the criteria of PMS. Having PMS had a direct and significant relationship with educational field ($P=0.001$), ethnicity ($P=0.023$), academic degree ($P=0.002$), educational level ($P=0.031$) and BMI ($P=0.001$). But it had an inverse significant relationship with the number of children ($P=0.001$). There was no statistically significant relationship between bleeding and marital status with PMS symptoms ($P<0.05$).
	Conclusion: The results showed that premenstrual syndrome is common among female university students in Golestan, North Iran. Educational Field, ethnicity, academic degree, educational level and BMI had a significant direct relationship with PMS and the number of children had a significant inverse relationship with PMS. Therefore, it seems necessary to raise awareness of university students about the symptoms about this disorder from the moment of entering the university.

► Please cite this paper as:

Amirimoghadam M, Zaman Kamkar M, Karamelahi Z. Prevalence of Premenstrual Syndrome and Its Related Factors among Medical University Students. Journal of Midwifery and Reproductive Health. 2025; 13(4): 5093-5102. DOI: 10.22038/jmrh.2024.75933.2243

Introduction

The American College of Obstetricians and Gynecologists (ACOG) defined premenstrual syndrome (PMS) as a clinical condition that appears with the occurrence of physical and emotional symptoms unrelated to any natural disease within five days before menstruation and ends four days after the onset of menstruation in three consecutive cycles with sufficient intensity

(1). Most women of reproductive age may feel more physiological or emotional discomfort in the week before menstruation (2). These symptoms are various in different people and can affect work, personal life and create stress in social relationships (3). Hippocrates suggested the association between the menstrual cycle and behavioral changes. Hippocrates considered the cause of headache and heaviness before

* Corresponding author: Mohammad Zaman Kamkar, Associate Professor of Psychiatry, Department of Psychiatry, Golestan Research Center of Psychiatry, Golestan University of Medical Sciences, Gorgan, Iran. Tel; 00989113715318; Email: kamkar@goums.ac.ir



Copyright © 2023 Mashhad University of Medical Sciences. This work is licensed under a Creative Commons Attribution Noncommercial 4.0 International License <mailto:https://creativecommons.org/licenses/by/3.0/>

menstruation to be anxious blood that is looking for a way out (4). This syndrome appears with periodic changes in the physical, mental and behavioral condition of women. Its beginning is 6-12 days before the monthly bleeding and its continuation for two days (maximum 4 days) after the beginning of bleeding (5). In addition, the symptoms of the syndrome should be registered at least for two consecutive months (6). In this era, aggression, anger and quick tempers are more common, which is the cause of many fights, divorces and murders (7).

Compared to women who have no history of this syndrome, women with PMS need more outpatient care and have higher treatment costs, and a higher rate of absenteeism due to medical reasons (8). Premenstrual syndrome affects not only the individual, but also her family; among these effects are incompatibility with spouse and misbehaving with children (9). Also, this syndrome leads to an increase in adverse educational outcomes such as reduced academic performance of students and social outcomes such as committing murder, crime and suicide (10). In general, PMS in many affected women leads to a decrease in social relations and a negative attitude towards being a woman and menstruation (11). In the new era, when women have achieved diverse roles and responsible positions in the labor market, premenstrual syndrome can deprive women from obtaining the best level of efficiency in performing tasks, and this issue reveals the importance of more evaluation of the causes of this condition (12). This syndrome is known as one of the most common diseases in the world (13). The overall prevalence of premenstrual syndrome is 48%; its prevalence has been reported between 52.9 and 98.2% in different studies (14-15).

In previous study in Golestan province, the prevalence of premenstrual syndrome was reported as 57.4% (16). The results of past studies show that age, smoking, alcohol and caffeine consumption, dietary patterns, use of contraceptive pills, exercise habits, menstrual and reproductive history, history of sexual abuse (17), history of premenstrual syndrome, sexual status (18), attitude towards menstruation (19), occupation, multiple pregnancies, genetics, level of education, social and cultural factors, religion and attention to performing religious duties,

duration of menstrual bleeding, duration of menstrual period, painful menstruation and presence of psychological pressure are effective in the prevalence of premenstrual syndrome (20). The cause of premenstrual syndrome has not yet been properly identified (21). This syndrome is not a single disorder, but a set of symptoms of biological origin, in which psychological and social aspects are also involved (22).

The factors such as periodic changes in ovarian estrogen and progesterone levels, disturbances in magnesium and calcium levels, endocrine disorders, disruption of the renin-angiotensin-aldosterone pathway, vitamin and mineral deficiency, genetics and lifestyle have been proposed as possible factors (23). Some researchers believe that psychological and stressful pressures can be effective in premenstrual syndrome (24). Stress causes mood symptoms by reducing beta endorphins in the brain and increasing the level of adrenal cortisol, and since cortisol and progesterone compete on common cell receptors, cortisol causes disturbances in the activity of progesterone and increases the activity of estrogen. The result of these changes causes the symptoms of premenstrual syndrome to start or worsen (25). At present, no definitive treatment is known for PMS (4,15,26). Several treatment methods include drug and non-drug treatments such as counseling and education, changes in lifestyle or diet, improvement of psychological capacity, cognitive therapy (27).

Considering that medical students are the future guardians of society's health, suffering from premenstrual syndrome can affect their individual and social functioning. The present study was conducted to investigate the frequency of premenstrual syndrome and its related factors among the students of Golestan University of Medical Sciences, Golestan, North Iran.

Materials and Methods

This cross-sectional study was conducted from April to the end of September 2021 on the students of different faculties of Golestan University of Medical Sciences Golestan, North Iran (Faculty of Nursing and Midwifery, Faculty of Health, Faculty of Medicine, Faculty of Dentistry, Faculty of New Technology and Faculty of Paramedicine).

The inclusion criteria were female students of Golestan University of Medical Sciences who had regular menstruation in the last 12 months. The exclusion criteria were a history of serious psychiatric disorders (such as psychotic, bipolar, major depression, panic, personality, etc.), drugs use, alcohol consumption, taking contraceptive pills, having any special diet (vegetarianism, raw foodism, thinness and obesity), history of internal diseases such as glandular disorders, autoimmune diseases, gynecologic diseases such as polycystic ovary syndrome, endometriosis, and unwillingness to continue cooperation.

The sample size was calculated based on the study of Zandi et al. (28) with confidence level of 0.95 and the test power of 0.80 and considering the error value of $d=0.05$ using the following formula for determining the sample size. Accordingly, 360 samples was estimated. Considering the 20% dropout, this number increased to 450 sample.

$$n = \frac{z_{1-\alpha/2}^2 pq}{d^2}$$

The Samples from each faculty (Faculty of Nursing and Midwifery (95/280), Faculty of Health (26/78), Faculty of Medicine (192/565), Faculty of Dentistry (59/174), Faculty of Modern Technology (12/34), Faculty of Paramedical Sciences (66/194)) were randomly selected using stratified sampling method with proportional allocation. The following formula was used to allocate the number of samples from each faculty.

$$n_j = \frac{n}{N} \times N_j$$

In this research the menstrual symptom assessment questionnaire (PSST) has been used. The PSST questionnaire consisted of 19 questions, which had two parts (the first part, which included mood, physical and behavioral symptoms, and the second part, which measured the impact of these symptoms on people's lives and included 5 questions). For each question, there was four answers: absolutely, mild, moderate and severe, and is scored from 0 to 3. The range of scores of the questionnaire was from 0 to 57, a score of 0-19 is considered mild, 19-28 is moderate, and 28-57 was

considered severe PMS. Cronbach's alpha for the German version of this tool is 0.92, and its retest reliability coefficient is 0.62 (29). The validity of the PMS questionnaire was confirmed by Dadi Givashad (30). Its reliability was calculated by Mohebi Dehnavi using Cronbach's alpha internal consistency method and the reliability coefficient was 0.77 (31).

After obtaining the necessary permission from Golestan University of Medical Sciences, the necessity of the implementation and the goals of the project were explained to the participants. Written informed consent was obtained from all participants. To collect data, the checklist related to demographic characteristics and menstrual status, including age, ethnicity, marital status, number of children, educational status, menstrual cycle status, duration of bleeding, and intensity of bleeding, was completed by the participants. Then, a questionnaire measuring menstrual symptoms was completed by the students using a self-report method.

The data were analyzed using SPSS software (version 16). In order to describe the data, descriptive statistics indices and appropriate tables were used to compare the variables in the two groups. Chi-square, independent T and Mann-Whitney tests were used to compare the variables in two groups. $P<0.05$ was considered statistically significant.

Results

Out of a total of 450 participants in the study, PMS symptoms were observed in 306 students (68%). Moreover, 135 (56%) of the participants were 22 years old and younger, and 171 (81.8%) aged 22 years and older had experienced PMS. In addition, 214 (66.5%) of the participants were single and 92 (71.9%) were married with PMS. Other demographic characteristics including educational Field, educational level, Academic degree, ethnicity/Race and marital status, are listed in Table 1. Also, 56.1% of participants had normal BMI that 55.9% of them were over 22 years old. Most of participants (67%) were Farsi and mostly single (69.9%). The highest frequency of this syndrome (42.2%) was observed in medical students and the lowest (3.2%) in modern technology students (Table 1).

Table 1. Frequency distribution of Demographic characteristics and menstrual status in students with and without premenstrual syndrome

Variable	Non PMS N (%)	PMS N (%)	P-Value
Educational field			
Nursing and Midwifery	57(60)	38(40)	0.001*
Health sciences	1(3/8)	25(96/2)	
Medicine	60(31.3)	132(68.7)	
Dentistry	13(22)	46(78)	
New Technology	0(0)	12(100)	
paramedicine	13(19.7)	53(80.3)	
Ethnicity/Race			
Fars	108(34.5)	205(65.5)	0.023*
Turkmen	17(23)	57(77)	
Sistani/ Baloch	0(0)	3(100)	
Turkish	10(28.6)	25(71.4)	
Kordish	9(36)	16(64)	
Marital status			
Single	108(33.5)	214(66.5)	0/267*
Married	36(28.1)	92(71.9)	
Number of children			
Without children	117(26.1)	247(54.9)	0.001*
One child	27(6)	35(7.8)	
Two children	0(0)	24(5.3)	
Academic degree			
Basic science course	51(38.9)	80(61.1)	0.002*
Internship	54(37.8)	89(62.2)	
Internship in field	39(22.1)	137(77/8)	
Educational Level			
Undergraduate student	50(41.3)	71(58.7)	0.031*
Master 's student	21(25.9)	60(74.1)	
Medical student	73(29.4)	175(70.6)	
Menstrual cycle			
Regular	116(33.8)	227(66.2)	0.39*
Irregular	28(26.2)	79(73.8)	
Body mass index			
<18.5	1(2.7)	36(97.3)	0.001*
18.5-24.9	136(43.9)	174(56.1)	
25-29.9	6(7.1)	78(92.9)	
<30	1(5.3)	18(94.7)	
Bleeding intensity			
Mild	18(40)	27(60)	0.114*
Medium	117(32.5)	243(67.5)	
Intense	9(20)	36(80)	

* Chi-square test

Premenstrual syndrome was also investigated based on clinical symptoms. Irritability/irritability, depressed mood and hopelessness and physical symptoms such as

breast pain, headache, muscle/joint pain, abdominal bloating and weight gain were the most common clinical symptoms of the affected students (Table 2).

The relationship between various demographic factors, BMI, as well as the menstrual cycle and the intensity of bleeding with premenstrual syndrome was also investigated. PMS had a direct and significant relationship with the educational field ($P=0.001$),

ethnicity ($P=0.023$), Academic degree ($P=0.002$), education level ($P=0.031$) and BMI ($P=0.001$). However, PMS had an inverse and significant relationship with the number of children ($P=0.001$) (Table 1).

Table 2. Frequency distribution of clinical characteristics of premenstrual syndrome in the study participants

Symptoms of premenstrual syndrome	Condition			
	Not at all/	mild	moderate	/severe
Anger / irritability	36(8.8)	36(8.0)	353(78.4)	25(5.6)
Anxiety/tension	53(11.8)	125(27.8)	164(36.4)	108(24.0)
Crying/sensitivity versus negative response	66(14.7)	85(18/9)	195(43.3)	104(23.1)
Depressed/despairing mood	41(9.1)	96(21.3)	186(41.4)	127(28.2)
Decreased interest in work or school activities	47(10.4)	164(36.4)	129(28.7)	110(24.4)
Decreased interest in indoor activities	91(20.2)	141(31.3)	117(26.0)	101(22/5)
Decreased interest in social activities	124(27.5)	138(30.7)	102(22.7)	86(19/1)
Difficulty concentrating (focusing on a lesson or any other task)	62(13.8)	128(28.4)	167(37.1)	93(20.7)
Fatigue/lack of energy	59(13.1)	91(20.2)	167(37.1)	133(29.5)
Binge eating/ cravings	190(42.2)	103(22.9)	84(18.7)	73(16.2)
Insomnia	212(47.1)	142(31.5)	84(18.7)	12(2.7)
Hypersomnia (need more sleep)	106(23.5)	109(24.2)	127(28.2)	105(23.3)
Feeling agitated or out of control	68(15.1)	118(26.2)	167(37.1)	79(17.6)
Having physical symptoms such as breast pain, headache, muscle/joint pain, abdominal bloating and weight gain	94(20.9)	44(9.8)	227(50.4)	85(18.9)

Discussion

The purpose of the present study was to evaluate the prevalence of PMS and its related factors among the students of Golestan University of Medical Sciences, Golestan, North Iran. The results of the study showed that 68% of the students had symptoms and signs of premenstrual syndrome. In the study by Noorjah et al (32), the prevalence of premenstrual syndrome reported as 82.5% that was higher than the present study. In some other studies (33-36), the prevalence of the syndrome was less than the current study. In the study of Ramadani Tehrani et al which was conducted on 1200 Iranian women aged 18 to 45 years, 34.5% of the samples were suffering from severe type of premenstrual syndrome (15). In the studies conducted in other countries, the frequency of this syndrome was lower or higher than the present study. In a study conducted in Egypt, the prevalence of premenstrual syndrome among female students was reported to be 65% (37). In the study by Costanian et al, PMS was observed in 63% of the study subjects, which is consistent

with the results of our study (39). While in the Abeje et al's study, the frequency of premenstrual syndrome was reported as 81.3% (38). In the study of Acikgoz et al, the prevalence of PMS among university students was 58.1% that was lower than the frequency of this syndrome in the present study (13). In the study conducted by Nandakumar et al in 2023 on 450 female students of the Indian University of Religion, they showed that the prevalence of PMS among these students is 76.35%, and the highest rate of PMS was reported in the 18-21 year old group without physical activity and with more stress (40). The study by Su Jeong et al (41) on the students of Si City University in South Korea, reported a prevalence of PMS of 27.3%. In general, the comparison of the prevalence of premenstrual syndrome in the present study with internal and external studies shows that there are similarities with some studies and differences with some other studies, which seems that the existing differences may be due to the use of definitions and different tools for evaluating premenstrual syndrome, different

sampling method, the different individual, social and cultural characteristics of the studied community and the different inclusion and exclusion criteria in these studies.

There are differences in the symptoms reported by people with PMS in various studies. In the current study, the most common symptoms reported were anger/irritability, depressed mood and hopelessness, and physical symptoms (such as breast pain, headache, etc.). In a study conducted in Turkey, the most common reported symptoms were irritability, fatigue, anxiety, feeling of fullness, abdominal pain, and discomfort (42). In the study by Ramezani et al., the most common symptoms were depression, pain and tenderness in the breasts, bruises and muscles (15). In the study by Buddhabunyakarn et al., the most common physical and behavioral symptoms in people suffering from PMS were breast pain (74.4%) and anger (97/7%) (43). In the study conducted in Lebanon, the most common affective and somatic symptoms were anger and flatulence, respectively (38). Researchers believe that people who live in different age (44), cultural (45), ethnic and racial (46) groups express different signs and symptoms.

According to the results of the present study, the frequency of PMS in students in the age group above 22 years was higher than those 22 years and less. There are conflicting results regarding the relationship between age and the prevalence of PMS. Some studies report a higher prevalence of symptoms in younger women (47-48), while in other studies, such as the study by Ramezani et al., the prevalence of PMS has also increased with age (15). This is while Gehlert S and colleagues did not report a relationship between age and PMS (49). These differences indicate that many variables are involved in the occurrence of PMS. Other studies also showed a significant relationship between education and PMS, so that higher education was associated with higher prevalence of PMS (15,50-51). In the study of Talai et al., there was a statistically significant relationship between the field of study and the level of education with the prevalence of premenstrual syndrome (34). Of course, in the study of Kayani et al., despite the fact that the lowest prevalence of PMS was found in women with primary education and the

highest percentage was related to high school education, diploma and then bachelor education and higher, but this relationship was not significant (52). Higher educational levels can be associated with better recognition and understanding of the symptoms, followed by more reports of this syndrome. Students of medical science also carefully review their symptoms. In addition, higher educational levels are associated with more stressful conditions, and in many studies, stress has also been mentioned as a factor for suffering from this syndrome and increasing the severity of the symptoms (53-54).

In the present study, despite the fact that the frequency of PMS was higher in married women than that of single people, this difference was not significant. This finding was consistent with the results of other studies (19,51,55). In our study, a statistically significant relationship was observed between the frequency of premenstrual syndrome and ethnicity. In their study, Takeda et al. found that race and ethnicity is effective in the occurrence of premenstrual syndrome (56). The results of the present study showed that the pattern of the menstrual cycle, including the regularity of the menstrual cycle and the intensity of bleeding, is not related to PMS. Some other studies reported that the relationship between menstrual pattern and PMS was not significant (22, 34, 36). In the current study, the relationship between PMS and body mass index was statistically significant, so that the frequency of PMS was significantly higher in students with a body mass index more than normal. In the study of Kayani et al. and Costanian et al., suffering from premenstrual syndrome had a significant relationship with higher body mass index (38, 52).

In another study, following a 10-year follow-up of 1057 women who did not have PMS at the beginning of the study, it was found that obese women had a higher risk of developing PMS during this follow-up period. It seems that obesity with its effect on estrogen and progesterone will alter neurotransmitter function such that estrogen will increase serotonin function through increased production, transport, reuptake, and receptor expression and postsynaptic response, while

lower estradiol levels associated with obesity may lead to serotonin dysfunction and then PMS (57). Considering the different variables as well as the geographical, cultural and ethnic dimensions involved in PMS, there is a need to investigate the prevalence of PMS in different communities in each geographical region, so that planning can be done for the prevention and timely treatment of this syndrome. The limitations of this study were the completion of the PSST/self-report questionnaire. Therefore, it is possible that mood, physical and behavioral symptoms are not reported in a completely real way. This study was conducted on single and married students from various medical fields, and compared to other studies, a larger sample size was examined which can be considered as the strengths of this study. It is suggested that in future studies, the effect of psychotherapy on the prevalence of PMS symptoms should be considered.

Conclusion

Premenstrual syndrome has a high prevalence among students, and its most common symptoms are anger and irritability. PMS had a direct relationship with field of study, ethnicity, level of education, and BMI, but an inverse and significant relationship with the number of children. It is suggested that students be screened at all levels and also given proper training about the symptoms of the syndrome, so that timely referral to a psychiatrist, proper diagnosis and treatment can be done.

Declarations

Acknowledgments

This research study is the result of the dissertation of General Medicine in Golestan University of Medical Sciences, Golestan, North Iran. The authors would like to express their gratitude to Golestan University of Medical Sciences Research and Technology Department, Golestan Psychiatric Research Center, 5 Azar Clinical Research Development Support Unit, officials and nurses of 5 Azar Hospital in Gorgan.

Conflicts of interest

The authors declared no conflicts of interest.

Ethical considerations

After obtaining the necessary permission from Golestan University of Medical Sciences, the necessity of the implementation and the goals of the project were explained to the participants. The participants in the study were also assured that the information would remain confidential. The participants were also assured that they could withdraw from the study at any stage. Written informed consent was obtained from all participants

Code of Ethics

The study has an ethics code number IR.GOUMS.REC. 1398.272 From Golestan University of Medical Sciences.

Use of Artificial Intelligence (AI)

No artificial intelligence was used in writing this manuscript.

Funding

This research did not receive any specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Authors' contribution

MZK and MAM conceived the idea and designed the work. MAM collected Data. ZK analyzed and interpreted the data. MAM prepared the draft of manuscript and MZK and ZK reviewed the manuscript critically for important intellectual content. All authors read and approved the final manuscript and agreed to be accountable for all aspects of the work.

References

1. Geta TG, Woldeamanuel GG, Dassa TT. Prevalence and associated factors of premenstrual syndrome among women of the reproductive age group in Ethiopia: Systematic review and meta-analysis. *PLoS One*. 2020; 15(11): e0241702.
2. Liu Q, Wang Y, Van Heck CH, Qiao W. Stress reactivity and emotion in premenstrual syndrome. *Neuropsychiatric Disease and Treatment*. 2017; 13: 1597.
3. Ryu A, Kim TH. Premenstrual syndrome: A mini review. *Maturitas*. 2015; 82(4): 436-440.
4. Kariman NS, Rezaeian M, Nassaji F, Valaei N, Gachkar L. The effect of exercise on premenstrual syndrome (PMS). *Journal of Zanjan Medical Sciences University and Health Services*. 2006; 13(53): 8-15.

5. Azhary S, Karimi Chatrudi A, Attarzadeh R, Mazloom R. Officacy of group aerobic exercise program on the intensity of premenstrual syndrome. *Iranian Journal of Obstetrics, Gynecology and Infertility*. 2005; 8(2): 119-128.
6. Lowdermilk P. *Maternity nursing*. 7th ed. Canada: Mosby; 2006.
7. Mahmudi Z, Shahpourian F, bastani F, parsai S, Hosseini F, The effect of adding carbohydrate diet in the form of food supplements on the severity of premenstrual syndrome, Improve the fourteenth year. *Journal of Kermanshah University of Medical Sciences*, Spring. 2010; 14(1): 10-19.
8. Borenstein JE, Dean BB, Endicott J, Wong J, Brown C, Dickerson V, et al. Health and economic impact of the premenstrual syndrome. *Journal of Reproductive Medicine*. 2003; 48 (7): 515-524.
9. Tavassoli A, Amanollahi, M. Studying the effect of couples' awareness of PMS (premenstrual syndrome) on marital satisfaction, 18th International Conference on Humanities, Psychology and Social Sciences, 2016 February 19. Tehran, Iaran.
10. Batra P, Harper M. Recognizing and treating pre al menstrodysphoric disorder. *Journal of Clinical Outcomes Management*. 2002; 2: 87-98.
11. Henshaw CA, PMS: diagnosis, aetiology, assessment and management. *Advances in Psychiatric Treatment*. 2007; 12: 139-146.
12. Maharaj S, Trevino K. A comprehensive review of treatment options for premenstrual syndrome and premenstrual dysphoric disorder. *Journal of Psychiatric Practice*. 2015; 21(5): 334-350.
13. Acikgoz A, Dayi A, Binbay T. Prevalence of premenstrual syndrome and its relationship to depressive symptoms in first-year university students. *Saudi Medical Journal*. 2017; 38(11): 1125-1131.
14. Direkvand Moghadam A, Kaikhavandi S, Sayehmiri K. The worldwide prevalence of premenstrual syndrome: a systematic review and meta-analysis study. *The Iranian Journal of Obstetrics, Gynecology and Infertility*. 2013; 16(65): 8-17.
15. Ramezani Tehrani F, Hashemi S, Robab Allameh M. Prevalence of premenstrual syndrome and some of its relative factors in reproductive age. *Quarterly of the Horizon of Medical Sciences*. 2012; 18(3): 121-127.
16. Bakhshandehnosrat S, Salehi M, Mobasheri E, Asghari Z, Mohammadkhani M. Prevalence of clinical manifestations of pre-menstrual syndrome and pre-menstrual dysphoric disorder among medical students in Gorgan, Iran (2010). *Journal of Gorgan Medical Sciences University and Health Services*. 2014; 16(3): 127-132.
17. Masho SW, Adera T, South-Paul J. Obesity as a risk factor for premenstrual syndrome. *Journal of Psychosomatic Obstetrics & Gynecology*. 2005; 26(1): 33-39.
18. Aghazadeh Naeini A, Tamjidi A, Vallaei N. Epidemiologic study of premenstrual syndrome in 15- 45 years old women in Tehran during the year 1995. *Pejouhandeh Quarterly Research Journal*. 1996; 1(2): 53-61.
19. Shahoei R, Nouri B, Darvishi N, Rezaie, Hiva Zandi Kh, Bayazidi Sh, et al . Prevalence of the Menstrual Disorders and its Related Factors in Students of Kurdistan University of Medical Sciences in 2018 . *Scientific Journal of Kurdistan University of Medical Sciences*. 2020; 25(4): 31 -41.
20. Ismail S. O'Brien. Premenstrual syndrome. *Women's Health Medicine*. 2006; 3(6): 272-275.
21. Pak Gouhar M, Mehran A, Ahmadi M, Salehi SM, Akhondzadeh S. Effect of hypericum perforatum L for treatment of Premenstrual Syndrome. *Journal of Medical Plants*. 2005; 4(15): 33-43.
22. Mishell DR. Premenstrual and Disease Burden. *American Journal of Managed Care*. 2005; 11: 473-479.
23. Speroff L, Fritz MA. *Clinical gynecologic endocrinology and infertility*. 7th ed. Philadelphia: Lippincott Williams and Wilkins; 2004.
24. Milani M. *Translation of Premenstrual syndrome disorders*. Tehran: Dorsa Publications; 2003.
25. Liu Q, Lin Y, Zhang W. Psychological stress dysfunction in women with premenstrual syndrome. *Heliyon*. 2024; 10(22).
26. Lentz G. Primary and secondary dysmenorrhea, premenstrual syndrome, and premenstrual dysphoric disorder: etiology, diagnosis, management. *Comprehensive Gynecology*. 6th ed. Philadelphia: Mosby Elsevier; 2012.
27. Jarvis CI, Lynch AM, Morin AK. *Management strategies for premenstrual syndrome/premenstrual dysphoric*

- disorder. *Ann Pharmacother.* 2008; 42(7): 967-978.
28. Zandi G, Onsory K, Helalat SH, Mirzaee S, Agha Alikhani E, Sadeghi Harsini M, et al. Prevalence of premenstrual syndrome and premenstrual dysphonic disorder among the students of Islamic Azad University of Parand. *New Cellular and Molecular Biotechnology Journal.* 2013; 3(9): 113-120.
 29. Bentz D, Steiner M, Meinlschmidt G. SIPS--Screening-Instrument für prämenstruelle Symptome. Die deutsche Version des Premenstrual Symptoms Screening Tool zur Erfassung klinisch relevanter Beschwerden [SIPS--screening instrument for premenstrual symptoms. The German version of Premenstrual Symptoms Screening Tool to assess clinically relevant disturbances]. *Nervenarzt.* 2012; 83(1): 33-39.
 30. Dadi Givshad R. Investigating the impact of life skills education on students' premenstrual syndrome symptom severity, residing in dormitories of Ferdowsi University of Mashhad in the school year 2012-2013. Presented for the MSc. Iran. Mashhad University of Medical Sciences. 2015.
 31. Mohebbi Z. The Comparison of aerobic exercise program in warm and cool temperament on severity of symptoms of premenstrual syndrome. Presented for the MSc. Iran. Mashhad University of Medical Sciences. 2016.
 32. Nourjah P, Gharahgozli Z. The prevalence of Premenstrual Syndrome among the students of Teacher Training University in Iran. *Materials & Energy.* 2006; 18(56): 559-568.
 33. Moasheri BN, Sharifzadeh GR, Miri MR, Rakhshany Zabol F. The effect of Iron and vitamin D supplementation on the severity of premenstrual syndrome symptoms through High school Female Students in the City of Birjand in 2015-2016. *Journal of Scientific Research in Medical Sciences.* 2018 Oct 15;25(3):213-22.
 34. Talaei A, Bordbar MRF, Nasiraei A, Pahlavani M, Dadgar SA. Epidemiology of premenstrual syndrome (PMS) in Students of Mashhad University of Medical Science. *Iranian Journal of Obstetrics, Gynecology and Infertility.* 2009; 12(2): 15-22.
 35. Alavi A, Salahimoghaddam AR, Alimalayeri N, Ramezanzpour A. Prevalence of clinical manifestations of premenstrual syndrome and premenstrual dysphoric disorder in students of Bandar Abbas Medical University. *Journal of Hormozgan University of Medical Sciences.* 2007; 10(4): 335-341.
 36. Razhan Chehreh, Batol Solaimannzhad, Zolaykha Karamelahi, Sara Mohammadnadjad. Investigating Anxiety and Depression in Medical Students with Premenstrual Syndrome. *Journal of Family Medicine and Health Care.* 2021; 7(4): 112-117.
 37. Abdelmoty HI, Youssef MA, Abdallah S, AbdelMalak K, Hashish NM, Samir D, et al. Menstrual patterns and disorders among secondary school adolescents in Egypt. A cross-sectional survey. *BMC Womens Health.* 2015; 15: 70-76.
 38. Costanian C, Akiki Z, Rabah Z, Daou S, Assaad S. Factors Associated with Premenstrual Syndrome and its Different Symptom Domains among University Students in Lebanon. *International Journal of Women's Health and Wellness.* 2018; 4(1): 068.
 39. Abeje A, Berhanu Z. Premenstrual syndrome and factors associated with it among secondary and preparatory school students in Debre markos town, North-west Ethiopia, 2016. *BMC Research Notes.* 2019; 12(1): 535.
 40. Nandakumar H, Kuppusamy M, Sekhar L, Ramaswamy P. Prevalence of premenstrual syndrome among students--Stress a potential risk factor. *Clinical Epidemiology and Global Health.* 2023; 23: 101368.
 41. Su Jeong Yi., Miok Kim., Ina Park. Levels and Factors of Premenstrual Syndrome (PMS) among Female College Students. *Research Square* (2023). Available from: <https://doi.org/10.21203/rs.3.rs-636014/v1>.
 42. Adiguzel H, Taskin EO, Danaci AE. The symptomatology and prevalence of symptoms of premenstrual syndrome in Manisa, Turkey. *Turk Psikiyatri Derg.* 2007; 18(3): 215-222.
 43. Buddhabunyakan N, Kaewrudee S, Chongsomchai C, Soontrapa S, Somboonporn W, Sothornwit J. Premenstrual syndrome (PMS) among high school students. *International Journal of Women's Health.* 2017; 9: 501-505.
 44. Cleckner-Smith CS, Doughty AS, Grossman JA. Premenstrual symptoms: Prevalence and severity in an adolescent sample.

- Journal Adolesc Health. 1998; 22(5): 403-408.
45. Anson O. Exploring the bio-psycho-social approach to premenstrual experiences. *Social Science & Medicine*. 1999; 49(1): 67-80.
 46. Rizk DE, Mosallam M, Alyan S, Nagelkerke N. Prevalence and impact of premenstrual syndrome in adolescent schoolgirls in the United Arab Emirates. *Acta Obstetrica et Gynecologica Scandinavica*. 2006; 85(5): 589-598.
 47. Sternfeld B, Swindle R, Chawla A, Long S, Kennedy S. Severity of premenstrual symptoms in a health maintenance organization population. *Obstetricians and Gynecologists*. 2002; 99(6): 1014-1024.
 48. Cohen LS, Soares CN, Otto MW, Sweeney BH, Liberman RF, Harlow BL. Prevalence and predictors of Premenstrual Dysphoric Disorder (PMDD) in older premenopausal women. The Harvard study of moods and cycles. *Journal of Affective Disorders*. 2002; 70(2): 125-132.
 49. Gehlert S, Hartlage S. A design for studying the DSMIV research criteria of premenstrual dysphoric disorder. *Journal of Indian Academy of Forensic Medicine*. 1997; 18(1): 36-44.
 50. Shomali LJ, Montakhab ZH. Frequency of premenstrual syndrome and its common symptoms in the age group 30-20 years of female students of Qazvin university of medical sciences and housewives Kowsar hospitals. Presented for the MSc. Qazvin: Qazvin University of Medical Sciences. 1997.
 51. Singh H, Walia R, Gorea RK, Maheshwari A. Premenstrual Syndrome (PMS) the malady and the law. *Journal of Indian Academy of Forensic Medicine*. 2004; 26(4): 129-131.
 52. Kiani AAH, Mohamadi M, Faqihzade S. Evaluation of premenstrual prevalence, signs, symptoms and risk factors in working women. *Shahed University Journal*. 2009; 81: 45-54.
 53. Yi SJ, Kim M, Park I. Investigating influencing factors on premenstrual syndrome (PMS) among female college students. *BMC Womens Health*. 2023; 23(1): 592.
 54. Abu Alwafa R, Badrasawi M, Haj Hamad R. Prevalence of premenstrual syndrome and its association with psychosocial and lifestyle variables: a cross-sectional study from Palestine. *BMC Womens Health*. 2021; 21(1): 233.
 55. Silva CM, Gigante DP, Carret ML, Fassa AG. Population study of premenstrual syndrome. *Revista de Saúde Pública*. 2006; 40(1): 47-56.
 56. Takeda T, Tasaka K, Sakata M, Murata, Y. Prevalence and premenstrual syndrom and premenstrual dysphoric disorder in Japanese women. *Archives of Women's Mental Health*. 2006; 9(4): 209-212.
 57. Bertone-Johnson ER, Hankinson SE, Willett WC, Johnson SR, Manson JE. Adiposity and the development of premenstrual syndrome. *Journal of Women's Health (Larchmt)*. 2010; 19(11): 1955-1962.