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Premenstrual Dysphoric Disorder and Associated Factors among Female University Students in Kerman, Iran: A Cross-Sectional Study

Soodeh Nosratabadi (BSc)[1], Atefeh Ahmadi (PhD)[2], Masumeh Ghazanfarpour (PhD)[3], Abolfazl Hossein Nataj (PhD)[4], Fahimeh Khorasani (PhD)[5*]

[1] Bachelor of Midwifery, Kerman University of Medical Sciences, Kerman, Iran
[2] Associate Professor, Reproductive and Family Health Research Center, Kerman University of Medical Sciences, Kerman, Iran
[3] Associate Professor, Reproductive and Family Health Research Center, Kerman University of Medical Sciences, Kerman, Iran
[4] Assistant Professor, Department of Biostatistics, Faculty of Health, Mazandaran University of Medical Sciences, Sari, Iran
[5] Assistant Professor, Reproductive and Family Health Research Center, Kerman University of Medical Sciences, Kerman, Iran

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ABSTRACT

Background & aim: Premenstrual Dysphoric Disorder (PMDD) is a severe mood-based condition characterized by cyclical symptoms. The aim of this study was to evaluate the severity of PMDD symptoms and its associated factors among female university students.

Methods: This cross sectional study included 223 female students at Kerman University of Medical Sciences from September 2020 to July 2021, who were selected using multistage sampling. Data were collected using self-structured demographic-menstrual questionnaire and the Daily Record of Severity of Problems (DRSP) on a self-report basis. Statistical tests including Chi-square, Fisher's exact test, Mann–Whitney U test, and logistic regression were used for data analysis.

Results: Overall, 77.6% of participants experienced PMDD symptoms (53.6% mild, 42% moderate, 3.6% severe, <1% highly severe). Significant associations were found between PMDD occurrence and menstrual characteristics (P<0.001). Logistic regression analysis identified menstrual period duration as a significant predictor; bleeding for 3-8 days increased the odds of PMDD by 12 times (OR=12.06, P=0.001), and >8 days increased the odds by 15 times (OR=15.33,P=0.026OR = 15.33, P = 0.026OR=15.33,P=0.026). Furthermore, the total DRSP score significantly predicted PMDD (OR=1.02, P=0.001).

Conclusion: PMDD symptoms are highly prevalent among female students and significantly influenced by menstrual characteristics. These findings highlight the importance of targeted screening and supportive interventions to improve menstrual health.

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Introduction

Premenstrual Dysphoric Disorder (PMDD) is a prevalent condition affecting women during their reproductive years (1). This multifaceted phenomenon encompasses an array of physical, emotional, and mental symptoms that manifest in the days preceding menstruation (2). Despite extensive research dedicated to understanding PMS, its exact etiology remains elusive; however, it is postulated to be intricately connected with hormonal fluctuations within the body (3).

Numerous studies have investigated the potential influence of factors such as familiarity and individual personality traits on the progression and intensity of PMDD symptoms (4-5). Researchers have focused on whether

* *Corresponding author*: Fahimeh Khorasani, Assistant Professor, Reproductive and Family Health Research Center, Kerman University of Medical Sciences, Kerman, Iran. Tel; 00989130400106; Email: fahimeh_khorasani@ymail.com

there is a familiar pattern in the manifestation of mood-related PMDD symptoms within families with a history of bipolar or major depressive disorder (6-7). However, these investigations have yielded inconsistent findings, with some studies failing to identify noticeable clustering or inheritance patterns among symptom experiences in affected families (8). PMDD affects women's status, interpersonal relationships, relationships with children, and social interactions to varying degrees (9). The prevalence and severity of PMDD differ among cultures, and its cause remains unknown. Approximately half of women globally experience symptoms associated with PMS (10).

Research in various countries has revealed different rates of prevalence for PMDD. In the United States, the prevalence of PMDD among women of reproductive age is between 20% and 40%, with 3% and 8% reported for premenstrual dysphoric disorder (11-13). Western studies have reported a 20–50% prevalence range for this syndrome (14). For example, a study by Eshetu et al. (2022) revealed that 37.9% of Wilkeite University female regular students had PMDDand that it was associated with several psychological and menstrual factors (15). Sporadic research suggests a high prevalence rate (50–80%) among Shiraz University of Medical Sciences students in Iran (16). PMDDcommonly manifests among those aged 25- 45 years.

The present study's theoretical or conceptual framework is based on the PMS biopsychosocial model and emotion regulation theory (17). The biopsychosocial model suggests that PMDDs are influenced by biological, psychological, and social factors and that they affect women's physical, emotional, and behavioral functioning. This framework acknowledges that biological factors do not solely cause PMDD but also considers the impact of psychological and social factors on PMDD symptoms. Fernández et al. (2019) reported that perceived stress, and coping strategies were strongly related to PMS and Premenstrual dysphoric disorder (PMDD) among Spanish individuals (18).

To date, researchers have identified a wide range of symptoms associated with PMS, encompassing various physical, emotional, and mental manifestations (5, 19). Physical symptoms exhibit the highest prevalence rate at approximately 91.7%, indicating their predominant nature in individuals experiencing PMDD (20). Mental and emotional experiences include withdrawal from social interactions, self-harm, heightened irritability, fluctuations in appetite patterns, elevated tension levels, profound exhaustion, exaggerated states of rage, heightened excitement levels, aggressive tendencies, and changes in sleep routines (5, 21). Depression is a primary concern and symptom experienced by individuals with PMS, affecting work productivity and interpersonal interactions (22).

Despite the high prevalence of premenstrual symptoms among young women, limited research has focused on identifying menstrual and lifestyle factors that may be associated with symptom severity among university populations in Iran. Therefore, The aim of this study was to evaluate the severity of PMDD symptoms and its associated factors among female students at Kerman University of Medical Sciences.

Materials and Methods

This study employed a cross-sectional design. The sample size was calculated to ensure adequate power for evaluating both the prevalence of PMDD symptoms and their associated factors. According to previous research and using G*Power software, the required sample size was calculated to be approximately 239 individuals, based on achieving a 99% confidence level and a 91% test power (23). Participants were recruited using a two-stage approach. Initially, convenience sampling was applied to identify eligible female students residing in university dormitories (during the academic year from September 22, 2020, to July 20, 2021). Subsequently, to minimize selection bias, a random selection of students was made from their dormitory rooms using a simple random sampling method.

This included not only those who experienced premenstrual syndrome but also all female students. The study aimed to assess the spectrum of premenstrual symptom severity, including the absence of symptoms, and thus did not exclude individuals based on their initial reported premenstrual symptom status. Their symptom presence and severity were objectively determined through the DRSP

instrument after data collection. However, the study excluded individuals with ongoing physical or mental health conditions, those who smoke, consume medications, contraceptive pills, or vitamins regularly, and those who recently experienced major life events within the past six months prior to the study commencement such as marriage or the loss of a family member.

The data collection process utilized two primary instruments: a researcher-developed demographic and menstrual characteristics questionnaire and the Daily Record of Severity of Problems (DRSP). These instruments were the sole tools employed for data acquisition in this study.

Demographic and menstrual characteristics questionnaire collected essential background information from participants, including age (in years), educational level, age at menarche (in years), typical duration of menstrual bleeding (categorized as less than 3 days, between 3 and 8 days, or more than 8 days), the usual interval between menstrual cycles (distinguished as less than 24 days, between 24-35 days, or over 35 days), perceived regularity of menstruation (yes/no), presence/absence of physical illness, presence/absence of mental illness, smoking habits (yes/no), medication usage patterns incident types (no/marriage/death of a relative), and exercise frequency (never/sometimes/regularly).

Symptoms and their severity were assessed using the DRSP. The DRSP is a well-established instrument specifically designed for the prospective evaluation of symptoms associated with PMDD/PMS, according to the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) and DSM-5. The questionnaire was completed by the participants using a self-report method, which took approximately 5 to 10 minutes to complete. Regarding the scoring system, participants were instructed to rate each symptom daily on a 6-point Likert scale, which ranges from 0, indicating 'no symptoms,' to 5, representing 'very severe symptoms (24).

The dependent variable of the study was the presence or absence of PMDD. First, demographic information of the participants was collected. Subsequently, based on the exclusion criteria, individuals who did not meet the required characteristics were removed from the study.

The DRSP was completed by the participants using a self-report method. Participants were instructed to rate each symptom daily on a 6-point Likert scale, ranging from 0 (no symptoms) to 5 (very severe symptoms). To capture the fluctuating nature of premenstrual symptoms accurately, participants completed the DRSP for at least one full menstrual cycle, specifically from one week before the expected onset of menstruation until four days after its actual onset. While clinical diagnosis of PMDD typically recommends prospective daily ratings over two consecutive menstrual cycles to establish a clear pattern, this study aimed to capture symptom severity within a single observed cycle to estimate prevalence and associated factors within the given timeframe.

Symptom severity scores were calculated by summing the daily scores for each symptom during the premenstrual period and subsequently calculating a mean percentage score across all symptoms. Based on these percentages relative to the maximum possible score, PMDD/PMS symptom severity was categorized into four levels: mild (less than 30%), moderate (30% to 50%), severe (50% to 60%), and very severe (greater than 60%).

The Persian version of the DRSP has demonstrated robust psychometric properties in previous studies conducted in Iran, confirming its validity and reliability for use in this population. The internal consistency of the DRSP in the present study, as evaluated by Cronbach's alpha, was 0.77 (25).

The data were analyzed via various descriptive and analytical statistical measures. Descriptive statistics such as frequency, percentage, mean, and standard deviation were employed to report the data. The analyses involved the use of chi-square tests and Fisher's exact tests to examine the relationships between qualitative variables. Stepwise logistic regression was used to assess factors impacting the presence or absence of syndrome symptoms. A Mann–Whitney U test was also performed to compare scores on the DRSP chart between the two groups. The normality of the response variable was assessed via the

Kolmogorov–Smirnov test. The data were analyzed with SPSS 20 software.

Results

A total of 223 female students participated in this study, with a mean age of 21.56 ± 1.94 years (Figure 1). Among the participants who completed the demographic questionnaire, the majority reported menstrual periods lasting between 3 and 8 days (89.3%). In addition, most students (80.7%) indicated that the interval between two menstrual cycles ranged from 24 to 35 days. Regarding menstrual regularity, approximately two-thirds of the participants (64.1%) reported irregular menstrual cycles. The mean age at menarche among the participants was 13.33 ± 1.51 years, with the earliest reported age being 10 years and the latest 23 years. Nearly all respondents (95.4%) experienced their first menstruation before the age of 15 years.

Participants were categorized into two groups based on the presence or absence of PMDD symptoms. According to the data presented in Table 1, a total of 173 students reported experiencing PMDD symptoms, while 50 students reported no PMS symptoms. These numbers were derived from the distribution of students across educational levels in the table, where 17 associate degree students, 134 bachelor's students, 13 master's students, and 9 doctoral students reported PMDD symptoms, resulting in a total of 173 individuals with the syndrome. Consequently, these figures indicate that approximately 77.6% of the participants experienced PMDD symptoms during the study period.

Table 1. The variables categorized by the occurrence of PMDD/PMS symptoms and the corresponding number of students

Variable	No. (%)	PMDD/PMS No. (%)		P-Value
		Yes	No	
Education				
Associate	19 (8.5)	17 (7.6)	2 (0.89)	0.452
Bachelor	176 (78.9)	134 (60.1)	42 (18.83)	
Master	18 (8.1)	13 (5.83)	5 (2.24)	
Doctorate	10 (4.5)	9 (4.03)	1 (0.45)	
The length of each menstruation period				
Less than 3 days	17 (7.6)	4 (1.8)	13 (8.83)	0.001
Between 3 and 8 days	199 (89.3)	163 (73.1)	36 (16.14)	
More than 8 days	7 (3.1)	6 (2.7)	1 (0.45)	
The interval between two menstrual periods				
Less than 24 days	26 (11.7)	19 (8.52)	7 (3.14)	0.035
Between 24 and 35 days	180 (80.7)	145 (65)	35 (15.7)	
More than 35 days	17 (7.6)	9 (4.03)	8 (3.59)	
Regular menstruation				
No	80 (35.9)	57 (25.56)	23 (10.31)	0.090
Yes	143 (64.1)	116 (52.02)	27 (12.11)	
Physical illness				
No	217 (97.3)	167 (78.9)	50 (22.42)	0.342
Yes	6 (2.7)	6 (2.7)	0	
Mental illness				
No	219 (98.2)	169 (75.78)	50	0.577
Yes	4 (1.8)	4 (1.79)	0	
Smoking				
No	214 (96)	170 (76.23)	44 (19.73)	0.005
Yes	9 (4)	3 (1.34)	6 (2.69)	
Medication use				
No	201 (90.1)	156 (69.95)	45 (20.18)	0.971
Yes	22 (9.9)	17 (7.62)	5 (2.24)	
Incident				
No	184 (82.5)	145 (65.02)	39 (17.5)	0.547

Variable	No. (%)	PMDD/PMS No. (%)		P-Value
		Yes	No	
Marriage	20 (9)	15 (6.72)	5 (2.24)	
Death of a relative	19 (8.5)	13 (5.83)	6 (2.69)	
Exercise				
Never	60 (26.9)	41 (18.38)	19 (8.52)	
Sometimes	139 (62.3)	114 (51)	25 (11.21)	0.100
Regularly	24 (10.8)	18 (8.1)	6 (2.69)	

Although 223 students initially participated in the study and completed the demographic questionnaire, only 138 participants subsequently completed the DRSP chart. The remaining participants did not complete the second questionnaire. Based on the available information, these individuals provided only demographic data and did not continue the daily symptom recording required for the DRSP instrument; therefore, they were considered to have withdrawn from the second stage of the study and were excluded from the DRSP-based symptom severity analyses. Accordingly, the analyses related to symptom severity and DRSP scores were conducted using the data obtained from the 138 students who returned completed DRSP charts.

Table 2. The means and standard deviations of the overall scores and individual question scores from the DRSP chart, categorized by syndrome status

Symptom	SD ± Mean	With the syndrome	Without the syndrome	P-Value
		SD ± Mean	SD ± Mean	
Total	151.72±100.11	192.39±85.02	55.51±58.98	0.001
Frustration and disappointment	15.12±10.31	18.80±9.11	6.39±7.34	0.001
Anxiety, nervous pressure	17.24±11.86	21.92±10.42	6.20±6.56	0.001
Difficulty in concentrating	9.86±9.51	12.88±9.27	2.71±5.42	0.001
Problems in daily interactions	12.83±10.22	16.43±9.52	4.32±5.87	0.001
Anger or irritability	19.41±11.96	23.31±10.88	10.20±9.04	0.001
Breast tenderness	13.92±12.27	18.72±11.05	2.56±5.85	0.001
Sleep disorder	10.62±10.03	13.69±9.88	3.34±5.76	0.001
Increased appetite	10.21±9.95	13.09±9.95	3.39±5.77	0.001
Sensitivity to rejection	10.82±10.55	13.96±10.35	3.39±6.64	0.001
Lethargy, fatigue	19.13±12.08	23.78±10.34	8.12±8.17	0.001
Less participation	12.57±9.20	15.81±8.19	4.90±6.57	0.001

Table 3. Variables affecting PMDD/PMS symptoms via logistic regression.

Variable	Regression coefficient (beta)	Standard deviation (SD)	Odds ratio (OR)	P-Value
The length of each menstruation period				
Less than 3 days	Reference	-	-	-
Between 3 and 8 days	2.49	0.61	12.06	0.001
More than 8 days	2.73	1.23	15.33	0.026

Among the participants who completed the DRSP chart, the overall mean score of the instrument was 151.72 ± 100.11, indicating a moderate level of symptom severity within the study population. Examination of individual symptom scores revealed that the highest mean values were related to anger or irritability (19.41 ± 11.96), lethargy or fatigue (19.13 ±

12.08), and anxiety or nervous pressure (17.24 ± 11.86).

When the mean scores were compared between students with PMDD and those without PMS, substantial differences were observed. The mean total DRSP score among students with PMS was 192.39 ± 85.02, whereas the corresponding score among students without PMDD was considerably lower, at 55.51 ± 58.98. Statistical comparison using the Mann–Whitney U test demonstrated significant differences between the two groups in terms of both the total score and the individual symptom scores (P = 0.001), indicating that students with PMDD consistently reported greater symptom severity across all evaluated domains (Table 2).

The relationship between PMDD symptoms and various demographic and menstrual characteristics was examined using chi-square analysis, with Fisher's exact test applied when necessary due to small cell counts. The results demonstrated statistically significant associations between PMDD symptoms and several variables. In particular, menstrual period duration showed a significant relationship with PMDD (P = 0.001). Students whose menstrual periods lasted between 3 and 8 days or longer than 8 days were more likely to report PMDD symptoms than those whose periods lasted less than three days. A significant association was also observed between the interval between menstrual cycles and PMDD occurrence (P = 0.035). In addition, smoking status was significantly related to PMS symptoms (P = 0.005), with smokers showing a higher prevalence of the syndrome. In contrast, no statistically significant associations were found between PMDD symptoms and education level, regularity of menstrual cycles, exercise habits, medication use, or the occurrence of life events such as marriage or the death of a relative.

Further analysis using logistic regression was conducted to identify factors independently associated with PMDD symptoms. The results indicated that menstrual period duration was a significant predictor of PMS. Compared with students whose menstrual periods lasted less than three days, those with periods lasting between 3 and 8 days had approximately twelve times higher odds of experiencing PMDD (OR = 12.06, P = 0.001). Similarly, students whose menstruation lasted longer than eight days had approximately fifteen times higher odds of reporting PMDD symptoms (OR = 15.33, P = 0.026) (Table 3).

Additional logistic regression analyses were performed to evaluate the association between DRSP scores and the occurrence of PMDD. The findings demonstrated a strong relationship between the total DRSP score and PMDD symptoms. Specifically, each one-point increase in the total DRSP score was associated with a 2% increase in the likelihood of PMDD occurrence (β = 0.022, OR = 1.02, P = 0.001). Moreover, all individual symptom items included in the DRSP chart showed statistically significant associations with PMS.

Table 4. The overall and individual question scores of DRSP chart regarding PMDD/PMS symptoms

Variable	Regression Coefficient (beta)	Standard deviation (SD)	Odds ratio (OR)	P-Value
Total	0.022	0.004	1.02	0.001
Frustration and disappointment	0.171	0.03	1.19	0.001
Anxiety, nervous pressure	0.185	0.033	1.20	0.001
Difficulty in concentrating	0.211	0.045	1.23	0.001
Problems in daily interactions	0.224	0.044	1.25	0.001
Anger or irritability	0.122	0.023	1.13	0.001
Breast tenderness	0.201	0.039	1.22	0.001
Sleep disorder	0.172	0.037	1.19	0.001
Increased appetite	0.159	0.036	1.17	0.001
Sensitivity to rejection	0.163	0.035	1.18	0.001
Lethargy, fatigue	0.160	0.027	1.17	0.001
Less participation	0.193	0.036	1.21	0.001

For example, each one-point increase in scores for frustration and disappointment, anxiety or nervous pressure, difficulty concentrating, problems in daily interactions, anger or irritability, breast tenderness, sleep disturbances, increased appetite, sensitivity to rejection, lethargy or fatigue, and reduced participation in activities corresponded to increases in the likelihood of PMDD ranging from approximately 13% to 25%. These findings suggest that higher scores across emotional, behavioral, and physical symptom domains are strongly associated with the presence of PMDD among the participants (Table 4).

Discussion

This study aimed to explore the severity of PMDD and identify the specific demographic, menstrual, and lifestyle factors linked to these symptoms among female students at Kerman University of Medical Sciences. The findings revealed that a large proportion of participants experienced PMDD, with 77.6% reporting symptoms during the week preceding menstruation. Regarding symptom severity levels, 53.6% reported mild symptoms, whereas moderate, severe, and highly severe symptoms were reported by 42%, 3.6%, and less than 1%, respectively, within our sample population. Prevalence studies consistently demonstrate that while PMS is highly common, severe symptoms represent the minority of cases. For instance, Nisar et al. (2008) observed that 59.5% of subjects experienced mild symptoms, compared to 29.2% moderate and 11.2% severe (26). Similar epidemiological distributions have been noted internationally, with mild symptoms accounting for roughly 80% of cases, while severe PMS or PMDD affects approximately 5% to 6% of the population (27). Statistics collected from various sources and studies conducted in different countries indicate noticeable disparities in the occurrence of varying degrees of PMDD symptoms. These differences can be attributed, to some extent, to cultural variations and negative societal views toward menstruation, which restrict women's ability to address menstrual issues openly (28-30). The current investigation focused on medical students with a more positive perspective toward menstruation owing to their extensive medical knowledge. Given that menstruation is a natural physiological process, these students accurately described symptoms associated with the menstrual cycle. This disparity contributes significantly to the statistical distinctions observed between this study and other studies concerning the prevalence of severe symptoms among individuals afflicted with PMDD (31-33). Stress has been found to trigger mood-related symptoms in individuals with PMS by affecting brain beta-endorphins and increasing adrenal cortisol levels. In study conducted by Kleinstäuber et al., a noteworthy correlation was discovered between stress scores and the severity of PMS symptoms. The study revealed that higher stress levels were associated with more severe symptoms in patients, which aligns with the findings of the current investigation (34). Similarly, Firoozi et al. identified stress as contributing to the development and increased severity of PMS symptoms and reported a significant relationship between these variables (5). However, study by Lee et al. (2005) on undergraduate students in Hong Kong, China, did not reveal any statistically significant associations between stress and PMS symptoms (35). Research suggests that anxiety sensitivity is crucial in manifesting physical and mental symptoms during menstruation (36). Studies have shown that women with higher levels of AS experience more menstrual symptoms than those with lower AS levels do, establishing a statistically significant association between these two variables (37-38). Cao et al.'s research on PMS identified irritability, anxiety, anger, and depression as common symptoms, findings supported by the present study, where anger and depression were also prevalent (39). Additionally, 17% of participants exhibited appetite changes during PMS, which was deemed statistically significant (39).

Compared with earlier research by Sayegh on PMS in 1995, carbohydrate-rich foods, such as soft drinks, can significantly increase tryptophan levels (40). This increase in tryptophan levels has been shown to reduce feelings of depression, anger, and restlessness within 90- 180 minutes of consumption. The current study also revealed a decrease in appetite and an improvement in these symptoms. A study by Lee et al. (2005)

examined the impact of pathological factors on PMDD symptoms, highlighting this as a possible explanation for the absence of a correlation between stress and the syndrome (35). Additionally, our current study revealed no association between education level and PMS, which is consistent with findings reported by Kiani et al. (2009) (41).

The strengths of this study include the substantial number of participants, the employment of dependable and valid tools, and the implementation of logistic regression analysis. A sizeable sample increases the applicability and credibility of the results. The use of reliable instruments such as the DRSP chart guarantees the precise evaluation of PMDD symptoms. Additionally, employing logistic regression analysis enables controlling for potential influencing factors and estimating the odds ratio for each variable, leading to a more thorough comprehension of multiple variables' influence on PMDD symptoms.

Several contextual factors may also contribute to the relatively high prevalence of symptoms observed in this study population. University students often experience academic stress, lifestyle changes, irregular sleep patterns, and dietary variations, all of which may influence menstrual health and symptom perception. In addition, medical students may be more aware of bodily symptoms and therefore more likely to report them accurately.

However, the findings of this study should be interpreted in light of several limitations. First, the cross-sectional design limits the ability to establish causal relationships between menstrual characteristics and premenstrual symptoms. Second, the use of self-reported data may introduce recall bias or reporting bias. Finally, the study population consisted of students from a single university, which may limit the generalizability of the findings to other populations.

Despite these limitations, the study provides valuable insight into the prevalence and associated factors of premenstrual symptoms among female university students. The relatively large sample size and the use of a standardized symptom assessment tool strengthen the reliability of the findings.

Conclusion

This study demonstrates that PMDD is highly prevalent among female university students, with symptom severity strongly associated with menstrual characteristics, particularly menstrual duration, as well as with a wide range of emotional, cognitive, and physical symptoms measured prospectively using the DRSP. The findings highlight the clinical and public-health relevance of PMDD in young women and underscore the importance of systematic symptom monitoring and increased awareness within university health settings.

Declerations

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Conflicts of interest

The authors declared no conflicts of interest.

Ethical considerations

The students who participated in this project consciously filled out the consent form. The ethical committee of Kerman University of Medical Sciences approved all the experimental protocols. Informed consent was obtained from all participants. There is consent to publish information in the article. Article could be sent to them at their personal request by email.

Code of Ethics

The present study was granted approval by the Ethics Committee of Kerman University of Medical Sciences under the ethics code of IR.KMU.REC.1398.498.

Use of Artificial Intelligence (AI)

No AI tools or AI-assisted technologies were used in the writing, analysis, interpretation, or preparation of this manuscript.

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Authors' contribution

FKh, AA, MGH, SN and AH designed the study. SN was involved in data collection. FKh and, SN finalized the results. FKh, AA, MGH, SN, and AH. contributed to the data analysis and interpretation. FKh and SN. wrote the draft of the manuscript, whereas FKh, AA, MGH, SN and AH. extensively reviewed the manuscript. All the authors read and approved the final manuscript.

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