Psychological Predictors of Premenstrual Syndrome

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Authors' contributions

This work was carried out in collaboration between all authors. Authors MF and FKH designed the study and wrote the protocol. Author SA managed the literature search, and wrote the first draft of the manuscript with assistance from authors MF and FKH. All authors read and approved the final manuscript.

Article Information

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ABSTRACT

Background: Premenstrual syndrome (PMS) is one the most common gynecological conditions that can impact an individual's interpersonal relationships, social interactions, academic performance, and emotional well-being.
Objective: The aim of this research was to determine the psychological predictors of PMS.
Methods: A cross-sectional study was planned with medical students of Babol University of Medical Sciences. Participants were 350 female students (175 with PMS, 175 without

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PMS). Psychological risk factors were assessed in four domains: affect, social support, personality, alexithymia with four questionnaires; Depression, Anxiety, Stress (DAS-21); Social Support questionnaire (SSQ); NEO-Five Factor Inventory of Personality (NEO-FFI); and 20-item Toronto Alexithymia Scale (TAS-20). Also, demographic, habits, and gynecological factors were evaluated as non-psychological factors. Analysis of data was performed with χ^2 test and multivariate logistic regressions analysis.

Results: The strongest predictor of PMS was alexithymia (OR 4.39; %95 CI 2.62-7.36). Risk of PMS was approximately 2.7 times higher in women with low social support (OR 2.67; %95 CI 1.59-4.48), 1.3 times higher in women with a neurotic character (OR 1.34; %95 CI 1.07-2.31), and 1.2- times higher in women with an increased level of anxiety symptoms (OR 1.17; %95 CI 1.06-2.13).

Conclusion: Psychological factors such as alexithymia character, neurotic personality, high anxiety, and low social support are helpful in differentiating women with PMS from those without PMS. This study proposes that psychological factors are the main predictors of PMS and should be considered for evaluation and treatment of the illness.

1. INTRODUCTION

Premenstrual Syndrome (PMS) consists of a variety of physical and psychological symptoms that appear in the late luteal phase of the menstrual cycle and disappear with the onset of menses [1]. There is a wide variation in the prevalence of PMS from studies around the world reporting a range between to be 5.3% and 52% [2,3]. In a survey from Iran, the prevalence of PMS has been reported 55% in medical students [4]. The extreme form of PMS is called premenstrual dysphoric disorder (PMDD). The prevalence of PMDD is 1.8-5.8% of PMS cause [5].

Women with PMS experience a variety of symptoms that can alter behavior and well-being and affect family, friends, and working relationships. Females with PMS reported a poorer health-related quality of life, and PMS may result in increased pharmacological treatment [6] and decreased social relationships and work success [7]. Firoozi et al. [8] reported that interpersonal sensitivity is higher in individual with PMS than healthy subjects. Previous studies on PMS have shown that many factors are related to this illness. These factors included poor lifestyle [9], poor quality of sleep [10], increased appetite [11], and greater alcohol intake [12].

Although premenstrual dysphoric disorder is not a culture-bound syndrome, recent evidence suggested that frequency, intensity, and expressivity of the symptoms and help seeking patterns may be significantly influenced by cultural factors [5]. Tschudin et al. [13] reported that socio-cultural factors seem to determine the prevalence, perception and handling of PMS. Lee et al. [14] indicated that there are overlapping and distinct features of PMS in Chinese women compared with pattern in West. Socio-cultural factors in Iran as compared countries may influence on PMS. High frequency of premenstrual symptoms (especially mood and anxiety symptoms) and significant prevalence of PMS was found in Iranian sample [15]. Some previous studies showed that some psychological problems like alexithymia are higher in Iranian patients with somatic disorders than those Western patients [16-18].

Previous research investigated the possibility of psychiatric comorbidity of PMS with panic disorder, mood and anxiety disorders [19,20]. A study showed that premenstrual symptom was associated with stress and poor mental health [21]. Also, there is relationship between Severity of PMS and Psychiatric Symptoms [8].

Although some psychosocial risk factors have been reported previously, few PMS studies have focused on subjects in young adulthood [22-23]. There are few studies that focused on the relationship of personality traits and alexithymia to PMS [24]. Also, little research is available regarding the role of psychological factors in the Iranian population with PMS. The aim of this study was to determine the predictors of PMS through regression in four categories: demographic, habitual, gynecological, and psychological. Measured psychological factors included: social support, affect (depression, anxiety, stress), personality traits (neuroticism, extraversion, openness to experience, agreeableness and conscientiousness) and alexithymia.

2. METHODOLOGY

2.1 Patients

A case-control study was planned between November 2012 and March 2013. A multistage cluster sampling was utilized to recruit the medical students of Babol University of Medical Sciences based on their field and academic years. A 450 total sample size of the students were selected from 1500 female students of three faculty clusters of Babol University of Medical Sciences (Medicine, Density, and Midwifery/Nursing). Also, four sampling units were selected based on academic years of the students (1 to 4 years). Then, 12-13 students randomly selected for every sampling units. Permission was sought from the dean of faculty to distribute the questionnaires to targeted respondents. Inclusion criteria for the students were willingness to participate in the study. We used the Premenstrual Assessment Scale (PAS) for diagnosis and severity of PMS [25]. The subjects completed the PAS for at least two menstrual cycles. Of 450 female students, 395 subjects completed the PAS for two months. The students were asked to complete the PAS one week before and after menstruation.

According to the American College of Obstetricians and Gynecologists criteria, at least two symptoms; one physical and one psychological symptom are necessary for PMS diagnosis [26]. 175 students were diagnosed with PMS and 175 students matched for academic year with the PMS group were selected as the non-PMS group. A member of the research team gave a brief explanation regarding the purpose of the plan, reminded the subjects of their right to not answer a question, and demonstrated how to fill in the questionnaire. The respondents were also told that their responses would be treated with the utmost confidentiality. All subjects were asked to complete four questionnaires. One questionnaire collected non-psychological data. This questionnaire included three parts: demographic factors, habitual factors, and gynecological factors. Psychological risk factors were evaluated in four domains: affect (depression, anxiety, and stress), social support, personality, and alexithymia. The four following questionnaires were used: Social support Questionnaires (SSQ), 20-item Toronto Alexithymia Scale (TAS-20), and NEO-Five Factor Inventory of Personality (NEO-FFI). The questionnaires took only 60 minutes to complete.

Ethical approval was granted by the Medical Education Ethics Committee at Babol University of Medical Sciences.

2.2 Measurements

2.2.1 Premenstrual assessment scale (PAS)

A 32 item designed questionnaire with a scaling from zero to 3 (0-no symptom, 1-mild, 2-moderate, 3-severe). This scale was developed and validated through an Iranian research project. Content and construct validity assessed for this retrospective self-report scale indicates two dimensions, physical and psychological symptoms. PAS validity had been appraised at 0.924 and its reliability has been calculated at 0.84 by retesting [25].

DSM-IV-TR was used for the diagnosis of PMDD. It defines PMDD as the presence of at least five of the following symptoms, depressed mood, hopelessness, humiliation, anxiety, tension, irritability, excitement, affect liability, withdrawal from people, marked anger, increased conflicts, and restlessness. Other symptoms are fatigability, impatience, confusion, decreased interest in usual activities, difficulty in concentration, lethargy, no control of behavior, lack of energy, change in appetite, overeating, food cravings, hypersomnia, insomnia, breast tenderness, breast swelling, flatulence, swelling of extremities, weight gain, headache, back or lower abdominal pain, joint or muscle pain. All symptoms are included in the PAS [27].

2.2.2 Non-psychological questionnaire

This was prepared from previous research in the literature [28-30]. It consisted of three parts: demographic factors, gynecological factors, and habitual factors. Demographic factors included age, socioeconomic status, family number, marital status, and Body Mass Index (BMI). BMI was classified as either underweight (<19.8kg/m2)], normal weight (19.8–24.9kg/m2), or overweight/obese (>25.0kg/m2) [31]. Gynecological factors covered menarche age, family history of PMS, menstrual cycle bleeding, and menstrual cycle duration. The presence of menstrual pain was measured by verbal multidimensional scoring system based on the degree of pain and restriction and activities [32]. The presence of PMS in a student's mother or sister was accepted as a positive family history. Menstrual cycle duration was classified as normal (21-35 days), short (<21 days), or long (>35 days). Menstrual cycle bleeding defined as short (<2 days), normal (2-6 days) or long (>7 days) [33]. Habitual factors covered the following data; caffeine consumption, breakfast consumption, and exercise. Intake of caffeine was determined to be excessive if consumption of caffeinated drinks, coffee, tea, and chocolate milk was self-reported as ≥300mg/day; and as minimum/ moderate if the daily intake of the items listed was <300mg/day. Students who had at least exercised 4 times exercise per week for 30 minutes each time were considered to have exercise [34-36]. Breakfast consumption was classified in to 2 groups: normal i.e. having breakfast one to six times per week, and low i.e., having breakfast less than once a week [37].

2.2.3 The scale of perceived social support

The Social support Questionnaires (SSQ) has 25 items and 5 subscales: perceived social support by the family (7scales), perceived social protection by friends (3scale), perceived social support protection by neighbors (4scales), perceived social support by the public [6 scales], and the notion or opinion about the support (5 scales) [38]. Persian validity was reported at 0.68 by using Cronbach's alpha [39]. Based on the distribution of the scores of the students, total scores of social support were categorized. We used cutoff scores of ≤11 for low social support and ≥12 for moderate/high social support.

2.2.4 Depression anxiety stress scale [DAS-21]

The DAS-21 is a self-report questionnaire designed to measure a range of symptoms including depression, anxiety, and stress. It contains 21 item and three subscales that cover depression (7 items), anxiety (7 items), and stress (7 items). Each item is scored from 0 (not present) to 3 (severe). Therefore, total scores for the subscales ranged between 0-21. We applied the following cutoff scores to assess the presence of symptoms: depression ≥10, Anxiety ≥8, Stress≥15 [40]. Also, we used a valid the Persian version of DAS-21 in this study [40].

2.2.5 TAS-20

Alexithymia defined as difficulty in identifying feelings, difficulty in describing feelings to other people, and constricted imaginable processes [41]. Alexithymia was assessed with the self-reported 20-item TAS-20. This scale contains 20 items and three subscales that cover difficulty in identifying feelings [7 items], difficulty in describing feelings (5 items), and externally oriented thinking [8 items]. The scores are on a 5-point (1 to 5). The total score for TAS-20 ranged between 20-100 [42]. We applied cutoff scores of ≤50 for non-alexithymia and ≥51 for alexithymia [43]. We used a TAS-20 version validated in the Iranian population [43].

2.2.6 NEO five factor inventory [NEO-FFI]

The NEO-FFI (60-item) describes the human personality using five factors or domains: neuroticism, extraversion, openness, agreeableness, and conscientiousness. Neuroticism is sometimes characterized by emotional instability. Neurotic persons experience negative emotions, such as anger, anxiety, and depression. Extraversion is defined by positive emotions and the sentiment to seek out stimulation and the company of others. Openness to experience is characterized by a general understanding for art, emotion, adventure, unusual ideas, imagination, curiosity, and variety of experience. Agreeableness is defined as compassionate and cooperative rather than suspicious and antagonistic towards others. Conscientiousness is defined by the presence of self-discipline, acting dutifully, and aiming for achievement against measures or outside expectations [44]. Cutoff for all subscales were considered as: ≥56 high, 45-55 moderate, ≤44 low [45]. We used a validated the Persian version of the NEO-FFI [46].

2.3 Statistical Analysis

Continuous factors such as age and family number were categorized based on the distribution of scores. PMS was coded as a dependent variable with a binary outcome [absent/present]. We used chi-square analysis to determine the univariate association between all psychological and non-psychological factors found in PMS. Then, each of the psychological non-psychological factors whose association reached statistical significance with univariate analysis ($P<0.05$) was included in multivariate logistic regression model. Multivariate regression was used to predict the value of the one or more risk factors from a set of predictors. We applied SPSS [Version 18.0] for data analysis. Odds ratios and 95% confidence intervals are presented for the main associations. $P<0.05$ was considered as significant.

3. RESULTS

The mean age of the participants was 20.41±1.63 years (range 17–25 years). 58.6% of the students were in the age group of 20 and below. 90.3% of the population was single. 66.6% of population reported that their family socioeconomic status was poor. 85.1% of students had 5 members in their family or less.

Characteristics of students by status of PMS are shown in (Table 1). There was statistically no difference between the PMS and non-PMS groups in regard to demographic variables (age, marital status, socio-economic status, and BMI).

Table 1. Demograghic factors of the female medical students with/without PMS

Variables	PMS			Univariate	P-value
	With (%)	Without (%)	Total (%)	OR (95%CI)	
Age					
≥20	102(49.7)	103(50.2)	205(58.6)	0.97(0.6-1.4)	0.500
<20	73(50.3)	72(49.7)	145(41.4)		
Socio-economic status					
Low	115(49.4)	118(50.6)	233(66.6)	0.9(0.6-1.4)	0.410
Middle/high	60(51.3)	57(48.7)	117(33.4)		
Marital status					
Single	153(48.4)	163(51.6)	316(90.3)	0.5(0.2-.99)	0.052
Married	22(64.7)	12(35.3)	34(9.7)		
Family number					
≤5 members	150(50.3)	148(4.7)	298(85.1)	1.1(0.6-1.9)	0.444
>6	25(48.1)	27(51.9)	52(14.9)		
BMI					
Overweight/obese	12(52.1)	11(47.9)	23(6.6)		0.500
Normal	150(49.3)	154(50.7)	304(86.8)		
Low	13(56.5)	10(43.5)	23(.6.6)		

Gynecological factors of students with PMS and without PMS are shown in (Table 2). 50.0% of students had a positive family history of PMS. 45(25.7%) students reported PMS as mild, 117(66.9%) students as moderate, and 13(7.4%) students as severe (PMDD). The average menstrual bleeding duration of the population was 6.39.±1.05 days, and in 87.1% of students the duration of menstrual cycle was normal. Their average menstrual cycle duration was 28.21±3.77 days, ranging between 3 and 10. There was statistically no difference between students with PMS and without PMS in terms of menarche age, menstrual cycle duration, menstrual bleeding duration, and family history of PMS (P>0.05).

Habitual factors of students with PMS and without PMS are shown in (Table 3).

There was statistically no difference between habit characteristics of students by status of PMS in regard to breakfast consumption and exercise; however, there was a difference in consumption of caffeine (P<0.05).

(Table 4) shows the psychological factors of students with and without PMS. 173 students (49.4) had alexithymic traits, that is they had difficulty in identifying their feelings or

expressing feeling to others. Univariate analysis shows that students with PMS were significantly more alexithymic than non- PMS students (P<0.001).

Students reported symptoms of depression, anxiety, and stress 34.5%, 40.0%, and 35.0%, respectively. In univariate analysis, students with PMS had significantly more symptoms of depression, anxiety, and stress than those without PMS (P<0.01).

Table 2. Gynecological factors of this population with/without PMS

Variables	PMS			Univariate	P-value
	With (%)	Without (%)	Total (%)	OR (95% CI)	
Menarche age					
≤12	59 (5.6)	60(50.4)	119(34.0)	0.95(0.6-1.5)	0.500
>12	116(50.2)	115(4.8)	231(66.0)		
Family history of					
PMS	101(51.0)	97(49.0)	198(56.6)	1.09(0.7-1.6)	0.374
Yes	74(48.7)	78(51.3)	152(43.4)		
No					
Menstrual cycle					
duration	18(40.0)	27(60.0)	45(12.9)	0.62(0.3-1.2)	0.101
Abnormal (<21 or ≥35)	157(51.5)	148(48.5)	305(87.1)		
Normal					
Menstrual bleeding					
duration (days)					0.131
≥7	67(54.5)	56(45.5)	123(35.1)	1.31(.08-2.0)	
<6	108(47.6)	119(52.4)	227(64.9)		

Table 3. Habitual risk factors of this population with/without PMS

Variables	PMS			Univariate	P-value
	With (%)	Without (%)	Total (%)	OR (95%CI)	
Caffeine intake					
level					
High	56(58.3)	40(41.7)	96(27.4)	1.58(0.98-2.5)	0.036
Low/middle	19(46.9)	135(53.1)	254(72.6)		
Breakfast					
consumption					
Low	12(37.5)	20(62.5)	32(9.1)	0.57(0.2-1.2)	0.097
Middle/high	163(51.3)	155(48.7)	318(90.9)		
Exercise					
Enough	33(47.8)	36(52.2)	69(19.7)	1.10(0.6-1.8)	0.394
No enough	142(50.5)	139(49.5)	281(80.3)		

High scores in the personality traits of neuroticism (29.4%), extraversion (16%), openness (11.1%), agreeableness (11.1%), and conscientiousness (15.1%), were reported in this study population. Univariate analysis showed that students with PMS were significantly more neurotic, open, and agreeable than non-PMS students (P<0.05). There was statistically no difference between students with PMS and non-PMS in the personality traits of extraversion and conscientiousness (P>0.05).

According to the bivariate analysis results (Tables 1-4), significant differences were revealed between students with PMS and without PMS in the following factors: caffeine consumption, alexithymia, low social support, depression, anxiety, stress, neurotic personality, openness, and agreeableness.

Backward stepwise logistic regression analysis was performed with the above 9 factors. The results of multivariate logistic regressions are shown in (Table 5). According to this analysis, alexithymia (OR 4.39; %95 CI 2.62-7.36), social support (OR 2.67; %95 CI 1.59-4.48), neurotic personality (OR 1.34; %95 CI 1.07-2.31), and a high level of anxiety (OR 1.17; %95 CI 1.06-2.13) were significantly important risk factors for PMS.

Table 4. Psychological risk factors of this population with/without PMS

Variables	PMS			Univariate	P-value
	With (%)	Without (%)	Total (%)	OR(95% CI)	
Social support					
Low	96(62.7)	57(37.3)	153(43.7)	2.51(1.6-3.8)	<0.001
Middle/high	79(40.1)	118(59.9)	197(56.3)		
Alexithymyia					
Yes	118(68.2)	55(31.8)	173(49.4)	4.51(2.8-7.1)	<0.001
No	57(32.2)	120(67.8)	177(50.6)		
Depression					
Yes	76(65.5)	40(34.5)	116(33.1)	2.59(1.6-4.1)	<0.001
No	99(42.3)	135(57.7)	234(66.9)		
Anxiety					
Yes	83(60.1)	55(39.9)	138(39.4)	1.96(1.2-3.0)	0.002
No	92(43.4)	120(56.6)	212(60.6)		
Stress					
Yes	52(65.0)	28(35.0)	80(22.9)	2.22(1.3-3.7)	0.002
No	123(45.6)	147(54.4)	270(77.1)		
Neuroticism					
High	64(60.4)	39(39.6)	103(29.4)	1.71(1.1-2.9)	0.007
Low/moderate	121(49.0)	126(51.0)	247(70.6)		
Extroversion					
High	31(55.4)	25(44.6)	56(16.0)	1.29 (0.7-2.9)	0.233
Low/moderate	144(49.0)	150(51.0)	294(84.0)		
Openness to experience	25(64.1)	14(35.9)	39(11.1)	1.91(0.9-3.8)	0.044
High	150(48.2)	161(51.8)	311(88.9)		
Low/moderate					
Agreeableness					
High	26(66.6)	13(33.4)	39(11.1)	1.83(0.9-3.8)	0.043
Low/moderate	149(47.9)	162(62.1)	311(88.9)		
Conscientiousness					
High	25(47.2)	28(52.8)	53(15.1)	0.87(0.4-1.5)	0.383
Low/moderate	150(50.5)	147(49.5)	297(84.9)		

Table 5. Risk factors for PMS analysed by multivariate logistic regression analysis

Variables	β	SE	OR	95% CI	P
Constant	-1.461	0.301			0.000
High caffeine consumption	0.082	0.289	1.08	0.61-1.91	0.777
Low social support	0.983	0.264	2.67	1.59-4.48	0.000
Alexithymia	1.481	0.263	4.39	2.62-7.36	0.000
Depressive symptoms	0.234	0.341	1.26	0.64-2.46	0.493
Anxiety symptoms	0.858	0.307	1.17	1.06-2.13	0.030
Stress symptoms	0.511	0.30	1.66	0.82-3.37	0.156
Openness to experience	0.207	0.402	1.23	0.55-2.70	0.607
Neuroticism trait	0.897	0.275	1.34	1.07-2.31	0.002
Agreeableness trait	0.197	0.409	1.21	0.54-2.71	0.631

4. DISCUSSION

To the best of our knowledge, this is the first study of psychological predictors of PMS in Iranian population. The results revealed that the strongest predictor of PMS was alexithymia. Findings noting higher levels of alexithymia in PMS students are consistent with previous researchers that suggested women with PMS/PMDD have significantly higher scores in the measure of alexithymia [24,47].

How is alexithymia associated with the development of PMS? The following are some of the possible underlying mechanisms that have been proposed. First, individuals with high alexithymia have difficulties in recognizing their own physical and emotional symptoms. This may be linked to the development of somatization pain [48,49]. Second, individuals with high alexithymia have a limited ability to cope adaptively with stressful events [50]. Also, a previous study reported that individuals with high alexithymia scores have relationship disturbance [51].

There is the potential for general hypersensitivity to both internal unpleasant sensations and externally induced pain. In alexithymic individuals, this is associated with an enhanced sensitivity [52]. Finally, alexithymia has been shown to be associated with chronic pain by its effects on negative affect [53].

Our findings showed that the second strongest predictor of PMS was low social support.

Some research, in line with the present study, has indicated that low levels of social support were associated with premenstrual symptoms [54]. Another researcher has indicated that providing of social support for women with PMS decreased impairment [55].

How can we explain why PMS students reported less adequate overall social support than non-PMS women? When this result was further investigated, the main difference was found in the higher frequency of inadequate relationship with friends among PMS subjects. The raises the possibility that students who report PMS may have less adequate social support due to the presence of unsatisfactory relationships. Another possible explanation of inadequate social support in students with PMS may be related to the high rate of alexithymia among this population. Other research supports our conclusion that many alexithymic persons have relationship disturbances [51]. Supporting the hypothesis that alexithymia is on impairment mediator of social interaction. Previous studies showed that high levels of alexithymia are associated with limited social support, impaired interpersonal

or social skills, fewer close relationships, and preoccupation with somatic complaints and depression [56,57].

According to our results, the prevalence of PMS was significantly higher among women who had neurotic personality. Some research, in line with the present study, has indicated that women who have a neurotic personality have a higher risk of PMS [58]. The association between neuroticism and PMS is probably connected to the influence of neuroticism on pain perception. It appears that neuroticism is a vulnerability factor, lowering the threshold at which pain is perceived as intense and threatening [59].

A few study limitations should be mentioned. First, we only identified the predictors of PMS in s case-control study. Thus, no causal relationship can be confirmed. Prospective cohort studies would be a more reliable way of related various risk factors and PMS. Second, the study has been performed in a single university; therefore the sample may not be representative of all Iranian female students at all Iranian universities. Third, data collection has been performed by self-reporting using questionnaires which may have resulted in underreporting of conditions. Future research might include a more detailed and complete analysis of alexithymia. In particular this might be obtained by using alternative methods such as interviews. Forth, the findings of the present study might be influenced by cultural factors. Further studies are needed to explain the role of cultural variables in the association between social support, the neurotic personality and PMS.

5. CONCLUSION

Our results showed that psychological factors such as alexithymia, neurotic personality, high anxiety, and low social support play significant role in predicting of PMS. This study proposes that all physicians, especially Gynecologists, should be   considered psychological factors in the evaluation and treatment of patients with PMS.

CONSENT

All authors declare that 'written informed consent was obtained from the patients for participants the study.

ETHICAL APPROVAL

Ethical approval was granted by Babol University of Medical Sciences

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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