Premenstrual Syndrome: Prevalence, Prognosticators and Impact on Women's Functional Status

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ABSTRACT:

Background: In the Indian setting, premenstrual syndrome (PMS) and its severe form, premenstrual dysphoric disorder (PMDD) are understudied. **Objectives:** This study aimed to examine the prevalence, predictors, and impact of PMS on women's functional status. **Methodology:** A cross-sectional survey was conducted through online mode among 750 women, aged 15 to 49 years, who had regular menstrual cycles. The Chi-square and Fisher's exact tests were used to examine the data. **Results:** 20.67% of individuals had moderate to severe PMS, and 8.93% experienced PMDD, which was found to interfere with family relationships in 64.5% of participants with moderate to severe PMS and 88% of participants with PMDD, respectively. Multivariate logistic regression revealed that the significant predictors included women who were aged 15 to 30 years, overweight, employed, had a family history of PMS, who consumed an excess of sweet food and rarely consumed fruits and vegetables, who had a sleep duration of 0-4 hours along with stressful lifestyle and who experienced emotional/ physical/ sexual abuse. **Conclusion:** PMS has a tremendous impact on women's daily lives, diminishing their productivity and lowering quality of life. The development of educational modules aids in providing accurate information, emotional, and medical assistance for women's menstrual health issues.

KEY WORDS- Premenstrual Dysphoric Disorder, Premenstrual Syndrome, Prevalence, Prognosticators, PSST.

INTRODUCTION

Menstruation is a normal physiological phenomenon with numerous bio-psychosocial mechanisms in women of reproductive age.[1] Large proportion of the female population suffers from menstruation-related health issues.[2] One among them includes premenstrual syndrome (PMS) and premenstrual dysphoric disorder (PMDD).[3] Premenstrual syndrome is the recurrence of a cluster of physical and psychological symptoms that occur post-ovulation, during the luteal phase of the menstrual cycle and usually subsides after the onset of menses.[1,4] It is one of the most frequent illnesses affecting women of reproductive age, with 5 % to 10% experiencing symptoms severe enough to interfere with everyday activities at any age, race, or location.[5] PMDD is a condition that is

similar to PMS, but it is more serious. It is a severe negative reaction in the brain to the natural rise and fall of estrogen and progesterone.[6]

According to studies on the epidemiology of PMS around the world, the prevalence of PMS is 47.8%, while the prevalence of PMDD is believed to be 3% to 9%.[7] In India the prevalence of PMS was found to be 43%, and that of PMDD was 8%.[8] Hormonal, psychological, and physiological factors influence the severity of PMS in women.[9] Depression, impatience, and hypersensitivity are the most prevalent mood changes. Mastalgia, acne, lethargy, bloating, and appetite changes are some of the physical indications and symptoms.[10] Physical symptoms are more prevalent than mental symptoms, which can vary in severity. Increasing age, usage of oral contraceptives, presence of co-morbid conditions, nulliparity, earlier age at menarche, a higher body mass index, increased alcohol and caffeine use, and stress have all been identified as risk factors for PMS.[11]

To understand clinically significant PMS, a variety of instruments have been explored. The Premenstrual Symptom Screening Tool (PSST) is one of them. It is a quick, easy, and accurate screening tool that serves as a good beginning point for further investigation. It reflects the categorical DSM-IV criteria into a severity-based rating scale.[12]

PMS and PMDD account for the understudied areas in the Indian context, and the causes of PMS may be complex and multifactorial necessitating further research. Hence, the objective of this study was to find out how common PMS is, how functionally impaired women with PMS are, and how PMS is linked to socio-demographic and lifestyle characteristics.

METHODOLOGY

Participants

A community-based cross-sectional survey through online mode was conducted from January to June 2021 among 750 women in South India, aged 15 to 49 and who had regular menstrual cycles. The study excluded participants who were pregnant, nursing, had reached menopause, had been diagnosed with a gynecological or psychological disorder or had undergone hysterectomy.

Sample size

Considering the anticipated prevalence of PMS as 18% at a 95% confidence interval (CI) with precision taken as 4% along with a non-response rate of 50%, the sample size calculated was 708 using the formula $S = \frac{(Z_{1-\alpha/2})^2 PQ}{d^2}$

Study procedure

An extensive literature survey was carried out after which the draft of the questionnaire was designed. The first section contained socio-demographic information as well as medical history. Section 2 included the participant's gynecological profile along with the menstrual pattern. Section 3 consisted of 14 questions that examine premenstrual symptoms. It also comprises five separate domains of functional impairment issues. On a four-point

Likert scale, participants score their experience with each symptom and functional impairment over the previous 12 months throughout the majority of the cycles as not at all, mild, moderate, or severe. Subjects with PMDD, moderate to severe PMS, and no/mild PMS were identified using PSST scoring criteria, and section 4 consisted of the participant's food and lifestyle trends. The questionnaire was then distributed to professionals in the field for feedback, content validity, and reliability. It was then pre-tested, and relevant improvements were made based on a few inputs before the final validated questionnaire was sent.

Data collection

Women were encouraged to take part in the survey. Using snowball sampling, data were collected. The link to the questionnaire was shared on social media, and participants were informed about the study's anonymity and voluntary participation. Before beginning the questionnaire, the participants gave their informed consent.

Ethical clearance

The Institutional Ethical Committee of Bapuji Pharmacy College, Davangere granted the study ethical approval. (BPC/IEC/68/2020-21)

Data management and analysis

The data which was acquired in Microsoft Excel spreadsheet was coded and then analyzed with STATA 14 software. A histogram was constructed and the Kolmogorov-Smirnov test was used to ensure that the values were distributed normally. Descriptive statistics such as mean and standard deviation, median and interquartile range (IQR) were used to examine demographic data, menstrual features, dietary patterns, and lifestyle behaviors. The Chi-square test and Fisher's exact test were used to examine the relationship between dependent and independent variables. Statistical significance was defined as a p-value of less than 0.05. The factors which were found to be statistically significant in univariate analysis were included in multivariate analysis for the strength of association with PMS. The strength of association was reported in an odds ratio of 95% CI.

RESULTS

The survey received responses from 1004 people in total. Among them, 750 people were included in the study and subsequently evaluated after 254 participants were eliminated based on the exclusion criteria. The socio-demographic characteristics of the respondents are shown in Table 1. 526(70.13%) participants belonged to the age group 21-30 years with median age (IQR), 22 (21, 24). The mean body mass index BMI (±SD) was estimated to be 21.95 ± 3.49.

Sl. No	Characteristics	Categories	Number of Participants (n=750), f (%)
Table 1: Descriptive Statistics of socio-demographic characteristics
1	Age	< 20	161(21.47)
		21-30	526(70.13)
		31-40	43(5.73)
		>41	20(2.67)
2	Body Mass Index	Underweight	126(16.80)
		Normal	493(65.73)
		Overweight	112(14.93)
		Obese	19(2.53)
3	Education Status	High School	16(2.13)
		Pre-University	30(4.00)
		Bachelors/Diploma	396(52.80)
		Masters	190(25.33)
		Doctorate/PhD	118(15.73)
4	Employment status	Employed	174(23.20)
		Homemaker	32(4.27)
		Student	511(68.13)
		Unemployed	33(4.40)
5	Marital status	Single	633(84.40)
		Married	115(15.33)
		Divorced	1(0.13)
		Widowed	1(0.13)

According to the PSST grading criteria, 222 (29.6%) of the 750 individuals had PMS. It was reported to be moderate to severe in 155 (20.67%) individuals, followed by PMDD in 67 (8.93%). Out of 222 participants who had PMS, 113 participants having moderate to severe PMS and 43 participants having PMDD belonged to the age group of 21-30 years. Figure 1 represents the prevalence of PMS.
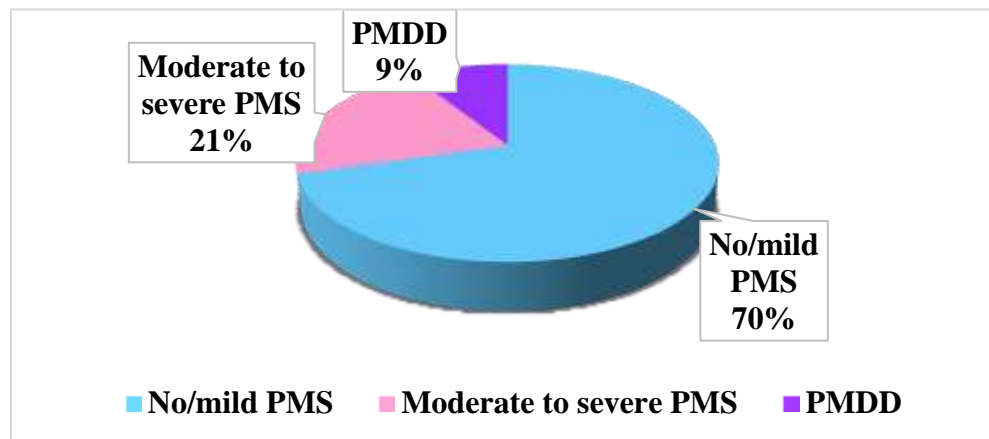
Figure 1: Prevalence of PMS

Table 2 represents the pattern of premenstrual symptomatology. Lack of energy was the most prevalent symptom reported by 128 (82.58%) women with moderate to severe PMS, followed by decreased interest in-home activities by 124 (80%) women. Out of 67 women with PMDD, 64 (95.52%) women reported decreased mood/ hopelessness as the most common symptom followed by decreased interest in work activities by 62 (92.54%) women.

Table 2: Pattern of Premenstrual Symptomatology						
Symptoms	No/Mild PMS (n=528)		Moderate To Severe PMS (n=155)		PMDD (n=67)	
	N	%	N	%	N	%
Anger/ Irritability	112	21.21	114	73.55	59	88.06
Anxiety /Tension	46	8.71	83	53.55	58	86.57
Tearful/ increased sensitivity to rejection	90	17.05	99	63.87	49	73.13
Depressed mood / Hopelessness	87	1648	116	74.84	64	95.52
Decreased interest in work activities	80	15.15	120	77.42	62	92.54
Decreased interest in-home activities	81	15.34	124	80.0	54	80.60
Decreased interest in social activities	73	13.83	106	68.39	45	67.16
Difficulty concentrating	77	14.58	104	67.10	48	71.64
Lack of energy	124	23.48	128	82.58	61	91.04
Over-eating /food cravings	92	17.42	95	0.29	42	62.69
Insomnia	56	10.61	62	40.0	22	32.84
Hypersomnia	74	14.02	82	52.90	35	52.24
Feeling overwhelmed/ Out of control	56	10.61	89	55.48	38	56.72
Physical symptoms	74	14.02	95	61.29	40	59.70

64.52% of women with moderate to severe PMS reported that PMS interfered with their relationship with family and 56.13% said that PMS interfered with their school/college/work efficiency/ productivity. 88.06% of women with PMDD also reported that PMS interfered with their relationship with the family followed by interference in relationships with friends/ classmates/co-workers in 86.57% of women which is illustrated in Table 3.

Table 3: Functional Impairment associated with PMS							
Functional Impairment	No/Mild PMS (n=528)		Moderate To Severe PMS (n=155)		PMDD (n=67)		P-Value
	N	%	N	%	N	%	
School/college/work efficiency/ productivity	29	5.49	87	56.13	44	65.67	**<0.001***
Relationships with friends/ classmates/co-workers	56	10.61	79	50.97	58	86.57	**<0.001***
Relationships with your family	67	12.69	100	64.52	59	88.06	**<0.001***
Social life activities	36	6.82	74	47.74	43	64.18	**<0.001***
Home responsibilities	47	8.90	86	55.48	48	71.64	**<0.001***
*Chi square test **p value < 0.05, considered as statistically significant**							

Table 4 represents the outline of multivariate logistic regression for the analysis of risk factors for PMS. Women under the age of 20 as well as those who were aged 21 to 30 were more likely to suffer from PMS. Participants who were overweight had completed high school and master's degree, those who were employed, and had a family history of PMS were also likely to develop the condition. Women who always ate sweet food were more prone to develop PMS, as well as women who rarely ate fruits and vegetables, who had a stressful lifestyle, and women whose sleep duration was 0-4 hours were found to be more likely to develop PMS than those who slept 4-8 hours, which is statistically significant. PMS was also linked to women who had been subjected to emotional, physical, or sexual abuse.

Table 4: Multivariate Logistic Regression for Analysis of Risk Factors for PMS				
Characteristics	Categories	P-Value	Adjusted Odds Ratio	95% Confidence Interval
Age	<20	**0.035***	5.77	1.13-29.57
	21-30	**0.046***	4.87	1.03-23.01
	31-40	0.086	4.44	0.81-24.40
	>41	Reference group		
Body Mass Index	Underweight	Reference group		
	Normal	0.417	1.26	0.72-2.23
	Overweight	**0.036***	2.12	1.05-4.27
	Obese	0.670	1.32	0.37-4.74
Educational status	High School	**0.040***	3.74	1.06-13.17
	Pre-University	0.994	1.00	0.37-2.75
	Degree/diploma	Reference group		
	Masters	**0.040***	1.98	1.24-3.15
	Doctorate/PhD	0.994	1.65	0.94-2.89
Employment status	Employed	**0.040***	1.04	0.60-1.80
	Homemaker	0.994	2.55	0.83-7.88
	Student	Reference group		
	Unemployed	0.268	1.68	0.67-4.19
Sexual Activity	Yes	Reference group		
	No	0.569	1.19	0.66-2.14
Use of contraceptives	Yes	0.123	1.71	0.86-3.43
	No	Reference group		
Age of menarche	9-12 years	0.083	1.91	0.92-3.97
	13-14 years	0.100	1.78	0.89-3.54
	15-17 years	Reference group		
Family History	Yes	**<0.001***	4.49	2.69-7.49
	No	Reference group		
	Don't Know	0.955	1.01	0.64-1.60
Alcohol	Not at all	Reference group		
	Rarely	0.058	1.61	0.98-2.645
	Frequently	0.793	1.28	0.21-7.89
Coffee intake	Not at all	0.988	1.00	0.56-1.81
	Rarely	Reference group		
	Frequently	0.332	1.26	0.79-2.035
	Always	0.678	1.14	0.62-2.08
Intake of sweet food/ chocolates	Not at all	Reference group		
	Rarely	**0.013***	9.13	1.58-52.79
	Frequently	**0.042***	6.38	1.06-38.17
	Always	**0.008***	11.36	1.86-69.24

Consumption of junk food	Not at all	0.472	1.43	0.54-3.77
	Rarely	0.864	1.04	0.66-1.63
	Frequently	Reference group		
	Always	0.716	1.18	0.49-2.81
Consumption of fruits and vegetables	Not at all	0.673	1.33	0.35-5.06
	Rarely	**0.007***	2.08	1.23-3.53
	Frequently	0.372	1.24	0.77-2.00
	Always	Reference group		
Area of residence	Rural	Reference group		
	Urban	0.090	1.44	0.94-2.21
Stressful lifestyle	Yes	**<0.001***	2.10	1.39-3.17
	No	Reference group		
Sleep duration	No sleep	0.122	5.75	0.62-52.79
	0-4 hours	**0.002***	4.97	1.79-13.81
	4-8 hours	**0.038***	1.92	1.04-3.57
	>8 hours	Reference group		
Usage of internet/ screen time per day	0-2 hours	Reference group		
	2-4 hours	0.211	1.90	0.69-5.22
	4-6 hours	0.430	1.51	0.54-4.20
	>6 hours	0.090	2.44	0.87-6.81
Recent trauma/ accident/death of close people/personal life disturbance	Yes	0.871	1.04	0.63-1.71
	No	Reference group		
Emotional/sexual/ physical abuse	Yes	**0.004***	2.37	1.32-4.27
	No	Reference group		
*p value<0.05 is considered statistically significant				

DISCUSSION

This was a community-based cross-sectional survey among women in South India that elucidated the prevalence, predictors, and impact of PMS on functional status in women. In our study, the prevalence of PMS was 29.6%, which was higher than the prevalence rates reported by Anitha et al,[13] Murlidhar et al,[14], and the results were consistent with Steiner et al[12] In comparison to a study conducted among Jordanian women, our finding is considerably low.[15] The prevalence of the disease varies by region. Different screening procedures, culture, societal variables, and sample size can all contribute to this discrepancy in rates. PMS is particularly common

among women of reproductive age, according to epidemiological studies in Asian countries. Premenstrual symptoms were shown to be more common in females between the ages of 21 to 30 in our study. This could be due to the fact that the majority of the respondents in our survey were in the same age range.

In our study, fatigue/lack of energy was the most commonly reported premenstrual symptom. Abdominal bloating, cramps, breast soreness, low mood, anxiety, and violent outburst was described as the most prevalent symptoms in investigations conducted by Fikru et al,[16] Nattapong et al,[17] and Abla et al.[15] The most common functional impairment in our study was interference with family relationships, which was consistent with the findings of a few other studies.[18,19]

In this study, the determinants of PMS were examined, and multivariate logistic regression revealed that women under the age of 20 are five times more likely to have PMS, and women between the ages of 21 to 30 are four times more likely to experience PMS than women of other ages. Our findings are consistent with prior research by Anitha et al[13] who found a strong association between mean age >19 years and PMS, as well as a study by Abebaw et al[20] who found that age was significantly associated with PMS. Younger women had more severe symptoms, according to Abla et al[15] and Nagashekhara et al.[21] These findings were similar to those of our research. Women who were overweight were shown to have a higher risk of PMS. Murlidhar et al [14] did a study that backs up our findings. PMS was found to be substantially linked with educational and work status in our study. These findings were compared to the findings of an Egypt-based study.[22] This could be due to the increasing responsibilities, social and economic issues that employed women encounter, which puts them under chronic stress and makes them more susceptible to premenstrual symptoms.

In our study, 52.53% of the participants had a family history of PMS, indicating that women with a family history of PMS were four times more likely to develop the condition. This conclusion is supported by various literatures.[21, 23, 24] There was no significant association between PMS and menarche age in our research. However, only a few studies[14,20] found a link between PMS and the onset of menarche at a young age.

In our study, women who consumed sweet food/chocolate regularly were eleven times more likely to suffer from PMS. It agrees with the findings from Mona et al,[9] which found a link between a high-calorie/high-sugar diet and premenstrual symptoms. By converting estrogen into an inactive state, reducing sweet food consumption may help to alleviate premenstrual symptoms. Recent research from Turkey and Iran backs this up.[25, 26] Women who rarely consumed fruits and vegetables had a higher risk of PMS, according to our research. It is consistent with the findings of Amany et al,[24] who found an association between lower fruit and vegetable intake and the prevalence of PMS. Stress is substantially linked to PMS, which is consistent with previous research.[30, 27] It's possible that higher stress levels are a key predictor of PMS because of scholastic and work-related pressure. Women with sleep durations ranging from 0 to 4 hours were shown to be four times more likely to experience PMS. According to a study conducted by Zambotti et al[28] during the late luteal phase of the menstrual cycle,

hormonal variations such as increased progesterone levels and decreased levels of its metabolite allopregnanolone cause sleep problems in women. It's uncertain whether early life abuse plays a role in PMS. One notable and novel finding of our study was the statistically significant correlation between PMS and women's experiences of emotional, physical, and sexual abuse. This is consistent with the findings of Elizabeth et al[29] who found that early-life emotional, physical, or sexual abuse raised the likelihood of PMS in the middle to late reproductive years significantly. There should be more extensive research done in India to determine whether early-life sexual, physical, or emotional abuse has a substantial impact on the pathophysiology of PMS.

There were a few drawbacks to the research. PSST is a simple and basic tool with recall bias due to its retrospective character. Any undiagnosed chronic medical disease could be a confounding factor. Because of the topic's sensitivity and the community's conservative bent, the response rate was not as expected and face-to-face interaction with women would have produced superior findings.

CONCLUSION

PMS is a relatively unknown condition in India, with just a few people aware of it. A considerable proportion of the surveyed population in our setting suffer from PMS and it has a substantial impact on everyday activities. PMS was found to be significantly associated with socio-demographic characteristics, dietary patterns, lifestyle variables, and personal life disturbances. Using innovative technological methods to design and introduce educational modules in schools and colleges could aid in delivering correct information, emotional, and medical assistance to students dealing with menstrual health difficulties. It is critical to urge women to follow a healthy lifestyle, which includes eating a well-balanced diet. The majority of the women are unaware of PMS and, as a result, do not seek proper medical care, which can have a bad influence on daily functioning and quality of life. Therefore, one of the responsibilities of clinicians is to screen for PMS and, if necessary, give treatment. Further study into the effective assessment and management of PMS in the Indian community should be directed based on the overall findings.

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