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Original Article

Obstetrics and Gynaecology Section

Association of Premenstrual Dysphoric Disorder with Depression and Anxiety in Women of Reproductive Age Group: A Cross-sectional Study

MANISHA UPADHYAY[1], SAURAV KUMAR[2], MEENU SAINI[3], PRIYA KUMARI[4]

ABSTRACT

Introduction: Premenstrual Dysphoric Disorder (PMDD) is a mood disorder affecting women during the luteal phase of the menstrual cycle. Its association with depression and anxiety has been documented. Despite of its significant impact on women's quality of life, physical and mental health, PMDD remains under evaluated and under researched in the Indian population.

Aim: To evaluate the association of PMDD with depression and anxiety.

Materials and Methods: The present cross-sectional study was conducted from August 2024 to January 2025 among 100 women aged 15-49 years presenting to Outpatient Department of Gynaecology in GS Medical College, Hapur, Uttar Pradesh, India with PMDD like symptoms. The Premenstrual Symptom Screening Tool (PSST) was applied to all these women and PSST score was calculated some other variables like age, education, occupation, length of menstrual cycle, duration and amount of menstrual flow was also recorded. All 100 patients diagnosed with PMDD and those who were having mild premenstrual symptoms were further screened and scored for anxiety and depression by using Beck's Anxiety Inventory (BAI) and Beck's Depression Inventory (BDI) scale. Association of PMDD with severity of anxiety and depression was analysed using Chi-square test. The difference in PSST score among various categorical groups like education, occupation, marital status and amount of menstrual flow was analysed using F-test of Analysis of Variance (ANOVA). Regression analysis was run to identify the significant predictors of PMDD.

Results: Out of 100, 65 women were diagnosed to have PMDD using PSST and 35 women had mild Premenstrual Syndrome (PMS). Significant differences in PSST Score were observed among groups categorised by education ($p=0.01$) and menstrual flow ($p=0.006$) implying that these factors influence PSST scores. Duration of menstrual flow found to be a significant predictor of PSST Score ($p=0.04$). The results showed a significant association between PSST score and both depression ($\chi2=84.22$, $p<0.001$) and anxiety ($\chi2=64.84$, $p<0.001$). Most women with PMDD experienced severe depression and moderate-to-high anxiety levels.

Conclusion: PMDD was significantly associated with increased severity of depression and anxiety. Low education levels and heavier or prolonged menstrual bleeding were the contributing factors.

Keywords: Luteal dysphoric disorder, Mental health, Menstruation, Mood disorders

INTRODUCTION

The PMDD which is also known as late luteal dysphoric disorder, has been defined as 'a mood disorder' which usually occur a week before menstruation and subside after the onset of the menstrual cycle [1]. Global research on PMDD suggests a prevalence of 3-8% [2]. The reported prevalence of PMDD in India has varied widely between 3.7 to 65.7% [3]. A systematic review and meta-analysis of prevalence rates of PMDD in India found that the pooled prevalence of PMDD was approximately 14% [4]. In 2013, the disorder was officially recognised by the Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5) under the category of depressive disorders [5].

PMDD is frequently associated with other psychiatric disorders like anxiety, depression, seasonal affective disorder, bipolar disorder etc., Studies have documented its association with anxiety and depression [6,7]. Patients with PMDD are more vulnerable for anxiety disorders and show premenstrual exacerbation of depressive symptoms [7]. Anxiety is a normal human emotion that encompasses behavioral, affective, and cognitive responses to the perception of danger. But its recurrent episodes can be detrimental as it may cause psychological impairment. The exacerbation of mental health disorders and common medical problems at specific phases of the menstrual cycle is a prevalent phenomenon. However, its cause is unclear. one possible reason could be the complex interactions between the immune and neuroendocrine systems [8]. There has also been evidence that the structure of the gray matter is affected in people with PMDD similar to those with depression [9].

It is important to understand this association as PMDD seriously impairs a woman's functionality and quality of life. It affects female behavior, cognitive capacities, mental health status, academic performance, interpersonal relationships, daily activities, and work productivity [10-12]. Burden of PMDD is quite high yet underestimated and under evaluated in Indian population. The wide range of prevalence rates of PMDD among Indian population and limited research invites further exploration. Data on its association with anxiety and depression is limited in Indian population [4]. Thus, this study aimed to evaluate the association of PMDD with depression and anxiety.

MATERIALS AND METHODS

The present cross-sectional study was conducted in the Outpatient Department of Gynaecology in GS Medical College, Hapur, Uttar Pradesh, India from August 2024 to January 2025. The study was ethically approved by the Institutional Ethical Committee (GSMCH/2024/IEC/11) and carried out in accordance with the Helsinki Declaration Principles. Study participants were the females

of reproductive age group who came to Outpatient Department of Gynaecology with complaints suggestive of PMDD and fulfilled the following inclusion and exclusion criteria.

Inclusion criteria: Patients of reproductive age group (15-49 years) who came to Outpatient Department of Gynaecology with complaints suggestive of PMDD like depressed mood, irritability, lethargy, joint pain, overeating, concentration difficulties and forgetfulness [5]. All females who complained of persisting anxiety or sadness of mood.

Exclusion criteria:

- Patients who did not give consent;
- Postmenopausal;
- Women on oral contraceptive pills and hormone replacement therapy;
- Active psychiatric disorder;
- Any psychiatric disorder history;
- Patients on psychotropic drugs;
- Patients having known gynaecological disorder.

Sample size selection: Sample size consisted of only those patients who attended the Outpatient Department of Gynaecology in GS Medical College, Hapur, Uttar Pradesh, India. Patients who presented with PMDD like symptoms in the given time which was from August 2024 to January 2025 who were fulfilling the inclusion and exclusion criteria were included in the study since it was a time bound study. Total 100 patients satisfied the inclusion and exclusion criteria during above mentioned time period and all of them were screened for PMDD with the help of PSST after obtaining written and informed consent [13].

Study Procedure

Patients were screened for PMDD with the help of PSST. PSST is a tool used to assess the severity of premenstrual symptoms and potentially screen for PMDD. It consists of total 19 items, first 14 items measure the severity of psychological and physical premenstrual symptoms and last five items (A, B, C, D, E) measure the severity of interference of symptoms on a woman's ability to function. Responses were recorded as not at all, mild, moderate and severe. The following criteria must be present for diagnosis of PMDD: 1) at least one of item 1-4 should be severe; 2) in addition at least four of item 1-14 should be moderate to severe 3) at least one of last 5 items (A, B, C, D, E) should be severe. The following criteria must be presented for diagnosis of moderate-to-severe PMS: 1) at least one of #1, #2, #3, #4 is moderate to severe; 2) in addition at least four of #1-#14 area moderate to severe; 3) at least one of A, B, C, D, E is moderate to severe.[13]. For the present study, presence of symptoms which doesn't fulfill above criteria will be were considered mild PMS. Four points Likert's scale was used to score each item on the scale of 1 to 4 in which score 1 is assigned to no symptom, score 2 to mild symptoms, score 3 to moderate and score 3 to severe symptom and the PSST score was calculated by summating individual item score [14]. The calculated PSST score was used to associate PMDD with anxiety and depression.

Out of hundred patients, 65 women were diagnosed to have PMDD and 35 women were found to have mild PMS. Some other variables like age, education, occupation, length of menstrual cycle, duration and amount of menstrual flow were also recorded. The number of pads used per day during the menstrual period was used to calculate the amount of menstruation. It was categorizsed as minimal (1 pad per day), moderate (2-4 pad per day) and heavy (>4 pads per day) [15]. The 'normal' menstrual cycle is conventionally classified as 21-35 days in length. Less than 21 days is considered as short cycle and more than 35 days is considered as prolong cycle [16]. All 100 patients were further screened and scored for anxiety and depression by using BAI and BDI scale [17,18]. BAI consist of 21 items each describing a common symptom of anxiety rated on four point likert's scale. The total score is calculated by summating the individual item score which can range from 0-63. Scores can categories the level of anxiety as low anxiety (score 0-21), moderate anxiety (score 22-35) and potentially concerning levels of anxiety (score 36 or above) [17]. Similarly BDI also consist of 21 items that measures the severity of depressive symptoms using four point likert's scale. Score can range from 0-63 and categorises the level of depression as normal (score 1-10), mild mood disturbance (score 11-16), borderline clinical depression (score 17-20), moderate depression (score 21-30), severe depression (score 31-40), extreme depression (score over 40) [18].

STATISTICAL ANALYSIS

Data was analysed using Statistical Package for Social Sciences (SPSS) version 22.0. Normality test was run and data was found distributed normally. Descriptive statistics was used for quantitative variables and results were expressed as mean and standard deviation. Categorical variables are expressed as frequency and percentage. Association of PMDD with severity of anxiety and depression was analysed using Chi-square test. The difference in PSST score among various categorical groups like education, occupation, marital status and amount of menstrual flow was analysed using F- test of ANOVA. Regression analysis was run to identify the significant predictors of PMDD.

RESULTS

Women who participated in the study were between 20-42 years with mean age of 29.24±6.45 years. Most of the participants had only completed primary school or were illiterate. Twenty three participants (23%) had only completed primary school and 23 (23%) were illiterate. Higher proportions of participant that is 72 (72%) were unemployed. Seventy participants (70%) were married. Significant proportion that is 52 participants (52%) lived in rural areas. Mean age of menarche, duration of menstrual flow and length of cycle was 12.3±1.51 year, 3.87±1.50 days and 29.63±4.62 days, respectively. Menstrual flow patterns shows that most of the participants 52 (52%) experience moderate flow, 25 (25%) had heavy flow and 23 (23%) had minimal flow. The sociodemographic and menstrual cycle details of the participants are tabulated in [Table/Fig-1].

Significant differences in PSST Score are observed among groups categorised by education (p=0.01) and amount of menstrual flow (p=0.006) implying that these factors influence PSST scores [Table/Fig-1]. Regression analysis was done to identify the predictors of PSST score and evaluate their statistical significance and it was found that education and amount of menstrual flow was a significant predictor of PSST Score (regression coefficient=-0.108, p-value=0.03 and regression coefficient=0.188, p-value=0.01, respectively) [Table/Fig-2]. Above findings implies that low educational status and increase amount of menstrual flow are associated with higher PSST Scores. Hence, such patients are more likely to develop PMDD.

The study analysed the association between PSST score and the severity of anxiety and depression using Chi-square tests as shown in [Table/Fig-3]. The results showed a significant association between PSST score and both depression ($\chi 2=84.22$, $p<0.0001$) and anxiety ($\chi 2=64.84$, $p<0.0001$). For depression, the majority of women with PMDD experienced severe 50 (76.9%) or extreme 10 (15.4%) depression, whereas those with mild PMS mostly had a normal 18 (51.4%) or mild mood disturbances 12 (34.4%). Similarly, for anxiety, most women with PMDD had moderate 44 (67.7%) or potentially concerning levels of anxiety 18 (27.7%), whereas those with mild PMS mostly had low anxiety 29 (82.8%). These findings suggest that women with PMDD are more likely to experience severe depression and moderate anxiety compared to those with mild PMS.

DISCUSSION

Current study demonstrates a significant association of PMDD with both depression and anxiety. Women with PMDD are more likely

Socio-demographic characterstics		Frequecy N=100	Percentage (%)	PSST Score	p-value
Age (years)	<20	11	11	52.36±16.28	0.31
	21-30	49	49	54.27±12.22	
	31-40	36	36	51.36±12.62	
	>40	4	4	60.25±8.06	
Education	Illiterate	23	23	56.61±11.96	0.01
	Primary	23	23	47.57±13.31	
	High school	12	18	51.17±11.75	
	Intermediate	18	18	53.39±13.95	
	Graduate	16	12	54.75±10.95	
	Postgraduate	6	6	64.17±5.34	
	Professional	2	2	46.50±16.26	
Occupation	Employed	28	28	54.68±11.64	0.19
	Unemployed	72	72	52.69±13.13	
Marital status	Married	70	70	52.69±12.70	0.35
	Unmarried	30	30	54.57±12.83	
Residence	Rural	52	52	52.68±10.64	0.98
	Urban	48	48	54.69±12.13	
Amount of menstrual flow	Moderate	52	52	50.75±13.48	0.006
	Heavy	25	25	57.60±9.16	
	Minimal	23	23	54.17±13.27	
Duration of flow	<7 days	95	95	53.41±12.95	0.87
	≥ 7 days	5	5	50.20±6.22	
Length of cycle	Short (< 21days)	1	1	55.00±NA	0.796
	Normal (21-35days)	92	92	53.47±12.71	
	Prolong (>35 days)	7	7	50.14±14.10	

[Table/Fig-1]: Sociodemographic and menstrual cycle details of the participants.

Predictor variables	Coefficient	p-value	Significance
Constant	50.72	<0.05	Significant
BDI	0.13	0.28	Not significant
BAI	0.19	0.14	Not significant
Age	0.08	0.62	Not significant
Duration of menstrual flow	0.001	0.99	Not significant
Education	-0.108	0.03	Significant
Amount of menstrual flow	0.188	0.01	Significant

[Table/Fig-2]: Regression analysis of predictors of PSST score.

Parameters		Prementrual symptom screening tool		Chi-square	p-vlaue
		Mild PMS n=35 (%)	PMDD n=65 (%)		
Depression	Normal	18 (51.4%)	0 (0%)	84.22	<0.001
	Mild mood disturbance	12 (34.4%)	2 (3.1%)		
	Borderline clinical depression	5 (14.2%)	3 (4.6%)		
	Moderate depression	0 (0%)	0 (0%)		
	Severe depression	0 (0%)	50 (76.9%)		
	Extreme depression	0 (0%)	10 (15.4%)		
Anxiety	Low anxiety	29 (82.8%)	3 (4.6%)	64.84	<0.001
	Moderate anxiety	6 (17.2%)	44 (67.7%)		
	Potentially concerning levels of anxiety	0 (0%)	18 (27.7%)		

[Table/Fig-3]: Association of PMDD & mild PMS with depression and anxiety.

to experience severe depression and moderate anxiety compared to those with mild PMS. Hence, patients with PMDD should be assessed for depression and anxiety. The studies done by Slyepchenko A et al., and Yen JY et al., also have the comparable results suggesting significant association of depression and anxiety with PMDD [6,7]. There are studies which provides evidence of white matter structural alteration in patients of PMDD which shares its association with anxiety and mood disorders, [19,20]. de Carvalho AB et al., also found a significant higher likelihood for current depression in people who had been diagnosed with PMDD [21]. A systematic review of 11 studies (conducted between 2001 to 2018) was done by Eccles H et al., to examine the association between PMDD and depression. The results indicate that PMDD increases the likelihood of depression and having a history of depression is associated with higher odds of having PMDD. This is true for current cases of depression, history of depression, single episode and recurrent depression. Some people who have had PMDD may develop depression and vice versa. Clinicians should be screening for PMDD in people with a history of depression and depression in people with PMDD [22]. In the above-mentioned review done by Eccles H et al., out of 11 studies the only study which did not find a significant relationship between PMDD and depression was completed by Ozturk O et al., which specifically examined the perimenopausal group of women [22,23].

PMDD was linked to low educational attainment. The majority of the sample in this study was either illiterate or had only completed primary schooling. A study done by Skrzypulec-Plinta V et al., in Poland showed similar results, this was a big study which included a sample size of 2500 women in the age group of 18-45 it showed that those women who have attained higher education are less susceptible to PMDD compared to those with a lower educational background [24]. A study conducted by Upadhyay M et al., which involved 420 college-going female participants, revealed that PMDD was more prevalent (prevalence 86%) among students in college [25].

Increased duration and amount of menstruation bleeding was significantly associated with a higher rate of PMDD. Therefore, it needs early screening and intervention. Some other studies also have similar results [11,26]. The possible reason might be that having a long duration of menstruation bleeding days could cause fluctuations ranging from hormone-related issues like estrogen and progesterone that can increase the vulnerability to PMDD because a drop in estrogen and progesterone may lead to a reduced level of serotonin, which can result in increased levels of sadness, anxiety, and irritability [26].

Limitation(s)

Cross-sectional design of study, smaller sample size and use of retrospective memory-based screening tool which could lead to recall bias were the limitation of current study. Time bound study was also one of the limitation due to which a limited number of people were included in the study. Hence, in future a prospective study can be planned with larger sample size using some prospective diagnostic tool.

CONCLUSION(S)

There is a significant association between PMDD, anxiety and depression. Women with PMDD are more likely to experience severe depression and moderate anxiety compared to those with mild PMS. Hence, patients with PMDD should be assessed for depression and anxiety. Early screening and intervention will decrease its negative impact on daily life.

Author's contribution: Dr. Manisha Upadhyay: Princpal investigator, Data collection, analysis, drafting of manuscript; Dr. Saurav Kumar: Co investigator, Data collection, reviewing manuscript, critical analysis; Dr. Meenu Saini: Data collection and review of manuscript; Dr. Priya kumari: Data collection, Data entry, analysis.

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PARTICULARS OF CONTRIBUTORS:
1. Associate Professor, Department of Obstetrics and Gynaecology, GS Medical College and Hospital, Pilkhuwa, Hapur, Uttar Pradesh, India.
2. Associate Professor, Department of Psychiatry, GS Medical College and Hospital, Pilkhuwa, Hapur, Uttar Pradesh, India.
3. Assistant Professor, Department of Obstetrics and Gynaecology, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India.
4. Postgraduate Student, Department of Psychiatry, GS Medical College and Hospital, Pilkhuwa, Hapur, Uttar Pradesh, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Manisha Upadhyay,
Associate Professor, Department of Obstetrics and Gynaecology, GS Medical College and Hospital, Pilkhuwa, Hapur, Uttar Pradesh, India.
E-mail: docmanisha.u@gmail.com

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