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Original Research Article

The premenstrual mind: examining cognitive distortions across symptom domains and severity levels of premenstrual syndrome

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ABSTRACT

Background: Premenstrual syndrome (PMS) is a prevalent condition in menstruating women, encompassing varied symptoms ranging from physical, behavioural, emotional, psychological, to cognitive symptoms. Cognitive changes during the PMS phase may contribute to distorted thinking patterns such as all-or-nothing thinking, emotional reasoning, personalization, etc, which may worsen mood, leading to exaggerated emotional responses. Emerging evidence suggests that the nature and extent of these cognitive distortions may vary with the severity of PMS symptoms. This study aims to investigate the presence of cognitive distortions during the premenstrual phase and examine whether the types of cognitive distortions vary across symptom profiles of PMS.
Methods: This cross-sectional study targeted female B.Sc. nursing students ranging from 17 to 26 years of age from S.C.B Medical College of Nursing, recruited after obtaining informed consent. PMS severity and cognitive distortions during the premenstrual phase are assessed and categorised using the premenstrual syndrome scale (PMSS) and cognitive distortion scale (CDS), respectively. Data is analysed for descriptive statistics and correlation was done using appropriate statistical packages.
Results: The PMS total score and PMS severity showed moderated positive correlation with most cognitive distortions, with the strongest relationship observed for emotional reasoning, catastrophization, all-or-nothing thinking, and mind reading. Moreover, within symptom domains, psychological symptoms demonstrated the strongest associations across most cognitive distortions.
Conclusions: The present study highlights a significant associations between the severity of PMS and cognitive distortions, among female nursing students, highlighting the importance of addressing cognitive patterns in the psychological management of PMS among young women.

Keywords: Premenstrual syndrome, PMS severity, Cognitive distortions, Nursing students

INTRODUCTION

Menstruation is a natural biological process experienced by women of reproductive age, typically occurring in a cyclical pattern. It involves shedding the uterine lining when pregnancy does not occur.[1] The menstrual cycle is orchestrated by a delicate balance of hormones, primarily estrogen and progesterone, which regulate the physiological and emotional changes that occur throughout the cycle. The menstrual cycle is divided into four distinct phases the menstrual phase, the follicular phase, the ovulation phase, and the luteal phase. Each phase is characterised by unique hormonal shifts that influence the body and mind in different ways. Though hormonal shifts are concomitant during the cycles, it spikes during the luteal phase. The luteal phase begins after ovulation and lasts until the onset of menstruation. For many women, menstruation is simply a routine part of life; however, for others, it can bring a range of physical and emotional challenges that extend beyond the

discomfort of cramps or bloating, where the luteal phase occurs, characterised by an increase in progesterone levels. It is during the luteal phase that many women experience premenstrual symptoms, as hormonal fluctuations can affect mood, cognition, and overall well-being. This range of symptoms is referred to as premenstrual syndrome (PMS). This syndrome entails physical and emotional symptoms, which are characterised by intense mood fluctuations that have the potential to disrupt daily functioning and strain interpersonal relationships. In PMS, symptoms typically manifest seven to ten days before the onset of menstruation (APA, 2013).[2] It encompasses a wide range of symptoms, including physical discomfort (such as bloating, breast tenderness, and fatigue), emotional distress (like mood swings, irritability, and anxiety), and behavioural changes (such as difficulty concentrating and changes in sleep patterns). These symptoms typically occur during the luteal phase and subside with the onset of menstruation.

The prevalence of PMS varies across different populations and is influenced by factors such as age, cultural background, and lifestyle. For instance, younger women and those with a family history of PMS are more likely to experience severe symptoms. Additionally, the severity of PMS can range from mild discomfort to severe symptoms that significantly impair daily functioning. PMS is a common condition that affects up to 75% of women of reproductive age. Women with PMS often report difficulties with concentration, memory lapses, and negative thought patterns, which can intensify feelings of frustration and helplessness.

Cognitive functioning is an important domain that gets significantly impacted by PMS. Cognitive distortions refer to irrational or exaggerated thought patterns that lead individuals to perceive situations in a negatively biased and inaccurate way. Further, these distortions directly interfere with the ability to regulate emotions effectively, exacerbating emotional volatility during the premenstrual phase.[3] During PMS, hormonal fluctuations, particularly the rise and fall of estrogen and progesterone, can exacerbate the irrational or biased ways of thinking that can negatively affect an individual's perception of reality. Studies demonstrated that cognitive distortions contribute to impaired emotion regulation in PMS, increasing the severity of mood swings and psychological distress.

Certain major cognitive distortions that affect the thinking pattern during PMS are catastrophizing, overgeneralization, and all-or-nothing thinking, which may heighten emotional dysregulation in PMS and PMDD, contributing to disruptions in mood and daily activities and may lead to exaggerated emotional responses and heightened distress. In PMDD, these cognitive patterns may worsen mood disturbances and contribute to functional impairment. Women with PMDD often report distorted thought patterns, which exacerbate feelings of hopelessness, irritability, and anxiety. Similar patterns are expected to occur in PMS as well. For example, a woman experiencing PMS might perceive a minor disagreement with a colleague as a personal failure, a classic cognitive distortion known as "all-or-nothing thinking." Such distortions can create a vicious cycle, where negative thoughts lead to emotional distress, further impairing cognitive function. Understanding the role of cognitive distortions in PMS is vital for developing effective interventions that address both the emotional and cognitive aspects of the syndrome.

Women with PMS and PMDD show greater cognitive vulnerability patterns similar to those seen in depression. Furthermore, those with PMS/PMDD demonstrate a more negative cognitive triad, biased information processing, and a tendency to describe themselves using more negative adjectives compared to women without PMS. Additionally, during the luteal phase, women with PMS/PMDD experience significantly higher sadness and irritability after experiencing failure, particularly among those not using oral contraceptives. These findings suggest that negative cognitive styles contribute to the development and emotional reactivity of PMS/PMDD, and that PMDD shares cognitive vulnerability features with major depressive disorders.[4]

Keeping that in mind, health-related professional programs often operate under academic pressure, demanding schedules, and emotional stress. Nursing students, in particular, are exposed to intensive academic workloads, long clinical training hours, and emotionally demanding healthcare environments, which may increase psychological strain and affect the way stressful experiences are cognitively processed. Highly demanding academic schedules and clinical training among nursing students may potentially distort thinking patterns and exacerbate the severity of premenstrual symptoms. Studies have shown that menstrual-related problems are highly prevalent in this population. A systematic review examining menstrual disorders among nursing students reported that approximately 62–65% experience PMS and a significant proportion experience PMDD, often leading to reduced academic concentration and clinical performance.

Several individual studies have also documented similar findings. For instance, research conducted among nursing students reported that more than 60% experienced PMS symptoms, with varying levels of severity that affected daily functioning and academic participation. Likewise, studies among university nursing students have found that emotional symptoms such as irritability, anxiety, and mood fluctuations associated with PMS frequently interfere with academic activities, social relationships, and overall well-being. Furthermore, moderate to severe PMS has been linked with reduced academic efficiency and productivity among nursing students, highlighting the functional impact of these symptoms on educational performance.[5] Women suffering from PMS and PMDD

have been found to exhibit more negative cognitive styles, biased information processing, and negative self-evaluation compared to women without PMS, suggesting that cognitive vulnerability may play an important role in the development and severity of symptoms.[4] Therefore, the demanding academic and clinical environment faced by nursing students may interact with cognitive processes, and the nature and extent of cognitive distortions may vary with the severity of PMS symptoms.

The link between cognitive distortions and PMS, although less studied, is conceptually supported by literature on mood disorders and hormonal fluctuations. Women experiencing PMS may interpret normal physiological changes negatively, leading to exaggerated emotional responses and distorted thinking patterns. Despite increasing interest in psychological symptoms of PMS, systematic examination and their significant impact, the role of cognitive distortions in PMS has not been thoroughly explored. This study aims to investigate the presence of cognitive distortions during the premenstrual phase and examine whether the types of cognitive distortions vary across symptom profiles of PMS.

METHODS

Study design

Cross-sectional study design was used in this research.

Sample

This study was conducted at S.C.B Medical College during the year 2025-2026. The study population consisted of female B.Sc. Nursing students recruited from S.C.B. College of Nursing, including those visiting SCBMCH for their internship. 161 students were recruited through purposive sampling. Consenting participants were asked to fill out the form offline.

Inclusion and exclusion criteria

The sample included individuals aged 17–26 who completed a minimum of higher secondary education and voluntarily consented to participate. Alongside, participants were excluded if they had a history of an existing psychiatric illness; or had an existing chronic medical illness.

Instruments

Socio-demographic clinical datasheet

Socio-demographic clinical datasheet, including age, gender, marital status, socioeconomic status, body mass index (BMI), and any conditions related to polycystic ovarian syndrome (PCOS) or polycystic ovarian disease (PCOD) was collected.

Premenstrual syndrome scale

The premenstrual syndrome scale (PMSS) was developed by Padmavathi et al to screen individuals and understand their PMS severity.[6] It comprises three subscales: Physiological, psychological and behavioural symptoms. This 5-point Likert- type scale consists of 40 items. The measurements range from Never as “1” point to always as “5” points. The PMSS total score is calculated by adding the scores of the subscales. The scale’s lowest score is 40 and its highest score is 200. If the scale’s total score reached 80 points or above, this indicates the occurrence of PMS. Increases in the scores indicate an increase in PMS severity. Based on the percentage of scores the levels of premenstrual symptoms were graded in four categories. They are “no symptoms”, “mild”, “moderate” “severe” and “very severe” symptoms. The inter-rater reliability coefficient, being highly tested, lies between 0.81 and 0.97.

Cognitive distortion scale

The cognitive distortion scale (CDS) was developed by Covin et al and consists of 10 items with mindreading, catastrophizing, all-or-nothing thinking, emotional reasoning, labelling, mental filter, overgeneralization, personalization, should statements, and minimising the positive. Each cognitive distortion is rated in two domains: interpersonal (IP) and personal achievement (PA). The scale uses the 7-point Likert-type scale, ranging from 1 (never) to 7 (all the time) to identify the frequency of practicing the listed cognitive distortions. The internal consistency of the scale was assessed using Cronbach’s alpha. The overall reliability of the scale was excellent (α=0.85).[7]

Procedure

The entire study took a maximum of 40 minutes. Participants were provided with an information sheet which consisted of the details of the study. They are assured that their personal details will be kept confidential and used for research purposes only. Participation in the study was completely voluntary and the respondents could withdraw their participation without any consequences at any point in time. Informed consent was obtained from the participants who were willing to proceed with the study. They were instructed that there are no right or wrong answers, so they are free to choose the responses that best describe them. Following the socio-demographic clinical datasheet, the participants were instructed to complete all the questionnaires one by one, without skipping any questions. The data was collected in-person, entered manually and coded appropriately.

Statistical analysis

Data analysis was conducted using Jamovi statistical software (v 2.7.23). Descriptive statistics were computed

to explore the sample characteristics. Mean and standard deviation for Age, BMI, PMS total scores and CDS total were calculated. Mean PMS total scores for PCOS and PCOD were also calculated. To examine the relationship between variables, Pearson's correlation analysis was conducted.

RESULTS

A total of 161 female B.Sc. nursing students aged 17–26 years participated in the study. The mean age of the sample was 20.10 years (SD=1.49). The average BMI was 23.80 (SD=4.99). The mean cognitive distortion scale (CDS) total score was 73.50 (SD=21.00), while the mean PMS total score was 97.90 (SD=28.26). Normality testing using the Shapiro–Wilk test showed that age (W=0.945, p<0.001) and BMI (W=0.946, p<.001) significantly deviated from normality. However, CDS total scores (W=0.984, p=0.062) and PMS total scores (W=0.983, p=0.050) did not significantly deviate from normal distribution, suggesting that the primary psychological variables approximated normality and were suitable for parametric analyses. Since age and BMI were not primary variables in subsequent analyses, parametric tests were considered appropriate.

Table 1: Descriptive statistics and normality tests for study variables.

Variables	N	Mean	SD	Min	Max	W	P value
Age	161	20.10	1.49	17.00	26.00	0.945	<0.001
BMI	161	23.80	4.99	15.50	41.80	0.946	<0.001
CDS total	161	73.50	21.00	29	121	0.984	0.062
PMS total	161	97.90	28.26	40	178	0.983	0.050

Table 2: Descriptive statistics of BMI, PMS Severity, and PMS Total by PCOS/PCOD Status.

Variables	Group	N	Mean	SD	Min	Max
BMI	Nil	147	23.65	5.06	15.5	41.8
	PCOS	8	24.59	4.54	18.7	31.6
	PCOD	6	25.68	3.71	19.9	29.5
PMS severity	Nil	146	1.99	0.76	1	4
	PCOS	8	2.13	0.64	1	3
	PCOD	6	1.83	0.75	1	3
PMS total	Nil	147	97.57	28.25	40	178
	PCOS	8	108.00	27.04	63	148
	PCOD	6	91.83	32.02	52	148

Table 3: Correlations between PMS variables and cognitive distortions.

Cognitive distortion	PMS total	PMS severity	Physiological symptoms	Psychological symptoms	Behavioral symptoms
Mind reading	0.397***	0.288***	0.323***	0.377***	0.353***
Catastrophization	0.405***	0.312***	0.323***	0.386***	0.365***
All-or-nothing thinking	0.402***	0.322***	0.297***	0.405***	0.366***
Emotional reasoning	0.409***	0.319***	0.329***	0.371***	0.386***
Labeling	0.348***	0.286***	0.200*	0.369***	0.359***
Mental filtering	0.338***	0.245**	0.225**	0.306***	0.371***
Overgeneralization	0.274***	0.255**	0.198*	0.266***	0.263***
Personalization	0.346***	0.272***	0.179*	0.394***	0.349***
Should statements	0.286***	0.217**	0.169*	0.286***	0.310***
Minimising the positive	0.242**	0.168*	0.100	0.314***	0.229**

p<0.05, ** p<0.01, *** p<0.001.

Participants without PCOS/PCOD constituted the majority of the sample (n=147). Individuals with PCOS (n=8) showed slightly higher BMI (M=24.59, SD=4.54) compared to those without PCOS/PCOD (M=23.65, SD=5.06) and those with PCOD (M=25.68, SD=3.71). With respect to PMS severity, the PCOS group demonstrated slightly higher mean PMS severity scores (M=2.13, SD=0.64) compared to participants without PCOS/PCOD (M=1.99, SD=0.76) and those with PCOD (M=1.83, SD=0.75). Similarly, the PCOS group demonstrated higher PMS total scores (M=108.00, SD=27.04) relative to the non-PCOS group (M=97.57, SD=28.25) and the PCOD group (M=91.83, SD=32.02). The correlation analysis examined the relationships

between PMS variables (PMS total score, PMS severity, physiological symptoms, psychological symptoms, and behavioral symptoms) and ten types of cognitive distortions.

The PMS total score showed moderate positive correlations with most cognitive distortions, with the strongest relationships observed for emotional reasoning (r=0.409), catastrophization (r=0.405), all-or-nothing thinking (r=0.402), and mind reading (r=0.397). PMS total was also significantly associated with labeling, personalization, mental filtering, should statements, and overgeneralization, though the strength of these relationships was comparatively lower. PMS severity was positively correlated with all cognitive distortions, with the strongest correlations observed for all-or-nothing thinking (r=0.322), emotional reasoning (r=0.319), and catastrophization (r=0.312). Although these correlations were statistically significant, they were generally smaller than those observed with PMS total scores, suggesting that symptom intensity may relate to cognitive distortions but not as strongly as the overall symptom burden.

When examining specific symptom domains, psychological symptoms demonstrated the strongest associations with cognitive distortions across most categories. In particular, psychological symptoms were positively correlated with all-or-nothing thinking (r=0.405), personalisation (r=0.394), catastrophization (r=0.386), and mind reading (r=0.377). Behavioural symptoms were also significantly correlated with several cognitive distortions, with the strongest associations observed for emotional reasoning (r=0.386), mental filtering (r=0.371), and all-or-nothing thinking (r=0.366). In contrast, physiological symptoms showed relatively weaker correlations with cognitive distortions, although significant associations were still observed with distortions such as emotional reasoning, catastrophization, and mind reading. The correlation between physiological symptoms and minimising the positive was not statistically significant, indicating that physical symptoms may have a less direct relationship with this particular cognitive distortion. Overall, the findings suggest that higher PMS symptom levels particularly psychological and behavioural symptoms are associated with greater tendencies toward cognitive distortions.

DISCUSSION

The present study examined the relationship between PMS severity and cognitive distortions among female nursing students, with the aim of determining whether specific patterns of distorted thinking vary with the intensity and across physiological, psychological and behavioural symptoms of PMS. The descriptive analysis provided an overview of the demographic and health-related characteristics of the participants included in the study. The sample consisted of female nursing students within the young adult age group, representing a population that is commonly reported to experience premenstrual symptoms due to academic stress and lifestyle demands. BMI categories indicated variability in participants' nutritional and weight status, with the majority falling within the normal BMI range, while a smaller proportion were classified as underweight, overweight, or obese. Variations in BMI are noteworthy, as previous research suggests that body weight and metabolic factors may influence the severity and manifestation of premenstrual symptoms. Additionally, a subset of participants reported a diagnosis of PCOS or PCOD, conditions that are often associated with hormonal imbalance, menstrual irregularities, and heightened susceptibility to premenstrual symptoms. The presence of these conditions within the sample provides important contextual information, as hormonal and metabolic factors linked with PCOS/PCOD may contribute to variations in both PMS severity and associated psychological experiences. Further, descriptive analysis provided an overview of the distribution and variability of PMS symptoms and cognitive distortions among the participants. The findings indicated that participants reported varying levels of premenstrual symptoms across physiological, psychological, and behavioural domains, suggesting that the experience of PMS within the sample was heterogeneous. Similarly, the descriptive analysis of cognitive distortions revealed that several distorted thinking patterns were present to varying degrees among the respondents.

Correlation analyses revealed that PMS total scores were moderately and positively associated with most forms of cognitive distortions measured by the Cognitive Distortion Scale. Among these, emotional reasoning, catastrophization, all-or-nothing thinking, and mind reading demonstrated the strongest relationships. These findings suggest that as the overall burden of PMS symptoms increases, individuals may be more likely to engage in negatively biased thinking patterns. Such results align with cognitive theories proposed by Aaron T. Beck, which suggests that emotional distress can activate maladaptive cognitive schemas, thereby increasing susceptibility to distorted interpretations of everyday experiences.[8] During the premenstrual phase, hormonal fluctuations and associated mood disturbances may therefore intensify cognitive biases and emotional reactivity, contributing to the emergence of such distortions.[9]

When examining specific PMS symptom domains, psychological symptoms demonstrated the strongest associations with cognitive distortions across most categories. For example, psychological symptoms showed relatively strong correlations with all-or-nothing thinking, personalisation, catastrophization, and mind-reading. This pattern indicates that cognitive distortions may be more closely linked to emotional and psychological aspects of PMS rather than purely physiological discomfort. Previous research has similarly indicated that women experiencing PMS frequently report heightened emotional

sensitivity, irritability, and negative affect, which may increase the likelihood of interpreting experiences through negatively biased cognitive frameworks.[10] The present findings extend this perspective by demonstrating that psychological PMS symptoms are consistently associated with multiple forms of distorted thinking.

Behavioural symptoms also showed meaningful associations with several cognitive distortions, particularly emotional reasoning, mental filtering, and all-or-nothing thinking. These findings suggest that behavioural manifestations of PMS, such as reduced concentration, altered sleep patterns, or decreased activity levels, may co-occur with cognitive patterns that selectively focus on negative experiences or interpret emotions as objective evidence of reality. Emotional reasoning, for instance, reflects the tendency to assume that negative feelings accurately represent external circumstances.[8,11] This cognitive style may become more prominent when individuals experience heightened emotional or behavioural disruptions during the premenstrual phase.

In contrast, physiological symptoms demonstrated comparatively weaker associations with cognitive distortions. Although some significant relationships were observed, the strength of these correlations was generally lower than that found for psychological and behavioural symptom domains. This pattern suggests that while physical discomfort associated with PMS may contribute to overall distress, it may not directly influence maladaptive cognitive processing to the same extent as emotional symptoms. Instead, cognitive distortions appear to be more strongly related to the psychological experiences accompanying PMS.[12]

Taken together, the findings of this study suggest that cognitive distortions are meaningfully associated with PMS symptoms, particularly those related to emotional and psychological experiences. However, these relationships appear to be selective rather than universal, with certain distortions being more strongly linked to specific symptom domains. The prominent association of psychological symptoms highlights the importance of considering emotional processes when examining cognitive functioning during the premenstrual phase.

CONCLUSION

The present study highlights a significant association between the severity of PMS and cognitive distortions among female nursing students. The findings indicate that higher PMS symptom burden is moderately related to increased tendencies toward distorted thinking patterns, particularly emotional reasoning, catastrophization, all-or-nothing thinking, and mind reading. Among the different symptom domains, psychological symptoms of PMS demonstrated the strongest associations with cognitive distortions. Behavioural symptoms were also found to be significantly associated with mental filtering, suggesting that behavioural changes during the premenstrual phase may reinforce attentional biases toward negative experiences. In contrast, physiological symptoms showed comparatively weaker relationships with cognitive distortions. The study underscores the importance of integrating psychological awareness and cognitive-based interventions in menstrual health and student well-being programs.

Several limitations should also be acknowledged. First, the cross-sectional design of the study limits the ability to draw causal conclusions regarding the relationship between PMS symptoms and cognitive distortions. Longitudinal studies examining cognitive patterns across different phases of the menstrual cycle would provide greater insight into the temporal dynamics of these relationships. Second, the sample consisted exclusively of nursing students from a single academic institution, which may limit the generalizability of the findings to other populations. Third, the study relied on self-report measures, which may be influenced by response bias or subjective perceptions of symptoms.

Despite these limitations, the present study contributes to the growing body of literature examining the psychological dimensions of PMS by highlighting the role of cognitive distortions in relation to symptom severity. By identifying specific cognitive patterns associated with psychological and behavioural symptoms of PMS, the study provides preliminary evidence that distorted thinking may represent an important cognitive component of premenstrual distress among young women. Future research may benefit from a regression analysis exploring the predictive value of PMS severity and the type of symptoms in understanding various cognitive distortions. These findings can potentially contribute to developing cognitive-based interventions to target the psychological burden associated with PMS. Addressing cognitive distortions during the premenstrual phase may help reduce emotional distress and improve coping, thereby supporting both mental health and academic functioning among young women.

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