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Premenstrual Syndrome In Relation To Body Mass Index among Students in a Tertiary Care Hospital in Southern India

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Abstract

Premenstrual syndrome (PMS) is a prevalent condition among young women, characterized by a variety of physical, behavioural, and psychological symptoms occurring in the luteal phase of the menstrual cycle. In the 21st century, obesity has become a significant global health concern, associated with numerous chronic diseases [1].However, when it comes to PMS, the relationship with obesity is less clear [2]. PMS is driven by hormonal fluctuations, and individuals with obesity are more likely to experience anovulatory cycle, which reduce the hormonal shifts necessary for PMS development. Therefore, normal BMI, rather than obesity, may be linked to a higher prevalence of PMS. The aim of this study was to investigate the association between Body Mass Index (BMI) and the prevalence and severity of PMS among medical students.

This cross-sectional study was conducted in a tertiary care hospital in southern India from July 2022 to July 2023. A total of 400 medical students were approached, of which 396 responded. After excluding participants with risk factors for PMS, 160 students were included in the final sample. Data were collected using a pre-validated questionnaire based on the American College of Obstetrics and Gynaecology (ACOG) criteria for

PMS diagnosis. The study population was stratified by BMI into underweight, normal weight, and overweight/obesity categories.

The results revealed that PMS prevalence was 40.4% in the study population, with the highest prevalence observed in individuals with normal BMI (48.75%). In terms of PMS severity, mild symptoms were more common in normal weight individuals (25.6%), while severe PMS was also more commonly found in this group (9.37%). A statistically significant association between BMI and PMS severity was identified ($p = 0.0018$) through chi square test. The most commonly reported behavioural symptoms were irritability (68.75%) and depression (38.75%), while the most frequent somatic symptom was headache (66.25%).

In conclusion, the study found that normal BMI is associated with a higher prevalence and severity of PMS compared to underweight and overweight individuals. This suggests that regular ovulatory cycles and hormonal fluctuations in normal weight individuals may contribute to the development of PMS. Further prospective studies are needed to confirm these findings and explore the underlying mechanisms linking BMI and PMS.

Keywords

Premenstrual symptoms (PMS), Body mass index (BMI).

Introduction

Obesity is an escalating issue in the 21st century, driven by sedentary lifestyles, poor dietary habits, and increased stress. It is a well-known risk factor for several chronic conditions, including cardiovascular disease, diabetes, and reproductive health disorders [3]. However, when it comes to premenstrual syndrome (PMS), the relationship with obesity is not as straightforward [2]. PMS is primarily a hormonal issue, typically occurring during the luteal phase of the menstrual cycle and characterized by physical, behavioural, and psychological symptoms that resolve shortly after menstruation begins.

For PMS to develop, regular ovulatory cycles are necessary, as they lead to the production of progesterone, a hormone implicated in PMS symptoms [4]. In individuals with obesity, anovulatory cycle is more common, which means the hormonal fluctuations required for PMS are less frequent. Therefore, although obesity is linked to many health problems, it does not appear to have a strong association with PMS. On the contrary, individuals with a normal BMI, who are more likely to experience regular ovulatory cycles, may be more prone to PMS.

The exact cause of PMS remains unknown, but various biosocial and psychological factors have been proposed, including abnormal serotonin function, altered progesterone levels, and lifestyle factors such as diet and exercise [5,6]. PMS affects up to 90% of women of childbearing age, with a smaller percentage meeting the criteria for the more severe form, premenstrual dysphoric disorder (PMDD) [7]. This study aims to explore the relationship between BMI and PMS in young women, particularly focusing on how normal BMI may be associated with higher PMS prevalence and severity.

Aims and Objectives

Aim

To investigate the association between PMS and BMI to provide evidence-based recommendations.

Objectives

To determine the prevalence of PMS among students.

To classify the study population by BMI and PMS and assess any potential association between these factors.

Methodology

This was a cross-sectional study conducted among 400 medical students at department of Obstetrics and Gynecology, NRI Institute of Medical Sciences, a tertiary care teaching hospital in South India to assess relationship between PMS and BMI using a questionnaire. Institutional ethical committee approval was obtained (Ref no IEC/NRI/34/2022). The questionnaire assessment period was between from July 2022 to July 2023. A total of 400 medical students were approached, and 396 responded to the initial questionnaire. After applying exclusion criteria to eliminate students with other risk factors for PMS, such as pre-existing medical conditions or irregular menstrual cycles, the final sample size was reduced to 160 participants. The process of study population selection and exclusion is summarized in **Flowchart 1**.

Flowchart 1

Flowchart 1 refers to the stepwise breakdown of the study population, from the total number of approached students (400), to those who responded (396), and the final sample after excluding students with risk factors (160).

Questionnaire distributed to 400 students

↓

396 students returned the questionnaires, which is taken as total population (100%)

↓

PMS +VE 194 students (49.98%) PMS -VE 202 students (51.02%)

↓

160 students (40.4%) met our inclusion criteria, which is taken as total PMS study population (n=160) and 34 students were eliminated due to presence of Risk factors

Data were collected using a pre-validated questionnaire based on the American College of Obstetrics and Gynecology (ACOG) criteria for PMS diagnosis. According to ACOG guidelines, PMS is diagnosed if at least one affective and one somatic symptom occurs during the five days preceding menstruation, over three consecutive cycles, and resolves within four days after menstruation starts [8].

The classification of PMS severity was based on the following criteria:

- **Mild PMS:** Characterized by the presence of 1-3 symptoms from either the affective(behavioural) or somatic categories that do not significantly impair daily functioning.
- **Moderate PMS:** Defined by the presence of 4-6 symptoms from either category, causing some degree of functional impairment in daily activities or social interactions.
- **Severe PMS:** Involves the presence of 7 or more symptoms from both affective and somatic categories, leading to significant disruption in daily life and overall functioning.

Affective (behavioural) and somatic symptoms are detailed in **Tables 4 and 5** of the results section.

The study population was categorized by Body Mass Index (BMI) into three groups: underweight (BMI <18.5), normal weight (BMI 18.5–24.9), and overweight/obesity (BMI ≥25).[9] Each participant was further evaluated based on the severity of their PMS symptoms, which were classified into three categories: mild, moderate, and severe. The distribution of PMS patients according to severity levels is illustrated in **Flowchart 2**.

Flowchart 2

Flowchart 2 illustrates the breakdown of PMS patients into three categories of severity (mild, moderate, and severe), showing how the 160 students with PMS were distributed based on the severity of their symptoms.

Total PMS Study population (n=160)

↓

Underweight	Normalweight	Overweight and Obesity
<18.5	(18.5–24.9)	>25
50 students (31.25%)	78 students (48.75%)	32 students (20%)
↓	↓	↓
Mild:31(19.37%)	Mild:41(25.6%)	Mild:25(15.6%)
Moderate:19(11.8%)	Moderate:22(13.75%)	Moderate:5(3.12%)
Severe: - Nil	Severe: 15 (9.37%)	Severe: 2 (1.25%)

Inclusion Criteria:

1. Unmarried female students aged 18-25 years with regular menstrual cycles and no pre-existing medical conditions (e.g., Diabetes, Hypothyroidism, PCOD).
2. Students not taking oral contraceptive pills.

Exclusion Criteria:

1. Students aged <18 or >25, or those who are married.
2. Students with irregular menstrual cycles, pre-existing medical or psychiatric conditions, or those taking oral contraceptives.

Results

This study was conducted at a tertiary care hospital in southern India from July 2022 to July 2023, involving 400 medical students. A questionnaire based on ACOG criteria was used to diagnose PMS. Of the 400 students who received the questionnaire, 396 responded. Among the respondents, 194 were diagnosed with PMS, while 202 were found to be PMS negative **(Table 1).**

Table 1: PMS Prevalence in Total Population

Total Population	PMS Positive	PMS Negative
396	194 (48.98%)	202 (51.02%)

From the 194 PMS-positive students, 34 were excluded due to risk factors, leaving 160 students (40.4% of the total participants) who met the inclusion criteria and were considered the PMS study population **(Table 2)**. These 160 students were further divided into three BMI-based groups: underweight (50 students, 31.25%), normal weight (78 students, 48.75%), and overweight/obese (32 students, 20%) **(Table 3)**.

Table 2: PMS Population and Risk Factor Elimination

Total PMS Population	Risk Factors Eliminated	Final PMS Study Population
194	34 (8.58%)	160 (40.4%)

Table 3: BMI Distribution in PMS Population

BMI Category	PMS Population	PMS Prevalence (%)
Underweight (<18.5 BMI)	50	31.25
Normal Weight (18.5–24.9 BMI)	78	48.75
Overweight and Obesity (>25 BMI)	32	20
Total	160	100

In the PMS study population, the behavioural symptoms are divided according to ACOG criteria. In our study most common behavioural symptom reported was irritability (68.75%) followed by depression (38.75%). **(Table 4).**

Table 4: Behavioural Symptoms in PMS Population by BMI

Symptom	Underweight (<18.5 BMI)	Normal Weight (18.5–24.9 BMI)	Overweight/Obesity (>25 BMI)
Irritability	39 (24.37%)	53 (33.12%)	18 (11.25%)
Depression	6 (3.75%)	43 (26.87%)	13 (8.12%)
Angry Outbursts	25 (15.62%)	25 (15.62%)	8 (5%)
Anxiety	14 (8.75%)	20 (12.5%)	5 (3.12%)
Confusion	5 (3.12%)	6 (3.75%)	2 (1.25%)
Social Withdrawal	3 (1.87%)	11 (6.87%)	5 (3.12%)

In the PMS study population, the somatic symptoms are divided according to ACOG criteria. In our study most common somatic symptom reported was headache (66.25%) followed by abdominal bloating (40%). **(Table 5).**

Table 5: Somatic Symptoms in PMS Population by BMI

Symptom	Underweight (<18.5 BMI)	Normal Weight (18.5–24.9 BMI)	Overweight/Obesity (>25 BMI)
Headache	38 (23.75%)	54 (33.75%)	14 (8.75%)
Breast Tenderness	2 (1.25%)	32 (20%)	20 (12.5%)
Abdominal Bloating	19(11.8%)	34 (21.25%)	11 (6.87%)
Swelling of Extremities	11(6.87%)	18 (11.25%)	3 (1.87%)

The **Table 6** represents the distribution of PMS severity (Mild, Moderate, Severe) across BMI categories (Underweight, Normal Weight, Overweight/Obese) in 160 individuals. Mild PMS was the most common severity level across all BMI categories, with the highest occurrence in the normal weight group (41 cases). Severe PMS was observed primarily in the normal weight group (15 cases) and was uncommon in the overweight/obese group (2 cases) and absent in the underweight group.

Table 6: PMS Severity by BMI Category

PMS Severity	Underweight (<18.5 BMI)	Normal Weight (18.5–24.9 BMI)	Overweight/Obesity (>25 BMI)		Total
Mild	31 (19.37%)	41 (25.6%)	25 (15.6%)		97(60.63%)
Moderate	19 (11.88%)	22 (13.75%)	5 (3.12%)		46(28.75%)
Severe	-	15 (9.37%)	2 (1.25%)		17(10.62%)
Total	50(31.25%)	78(48.75%)	32(20%)		

Statistical Analysis:

A Chi-Square Test of Independence was performed to examine the relationship between BMI categories (Underweight, Normal Weight, Overweight/Obese) and the severity of PMS (Mild, Moderate, Severe). The analysis was carried out using Python (version 3.x) and the SciPy library (version X.X). **(Table 7).**

Table7: Chi square Test Association between BMI and PMS Severity

Contingency Tables

BMI Category	Mild PMS	Moderate PMS	Severe PMS	Total
Underweight	31	19	0	50
Normal weight	41	22	15	78
Overweight/obese	25	5	2	32
Total	97	46	17	160

The SciPy. stats. chi2_contingency function was applied, which calculates the Chi-Square statistic, degrees of freedom, p-value, and expected frequencies based on the observed contingency table. A significance level of $p < 0.05$ was used to determine statistical significance.

χ^2 Tests

	Value	df	p
χ^2	17.21	4	0.0018
N	160		

The results indicated a significant association between BMI categories and PMS severity, with a Chi-Square statistic of 17.21, degrees of freedom (df) of 4, and a p-value of 0.00176. The expected frequencies for each cell were also analysed to ensure the validity of the test assumptions.

Discussion of Statistical Results

1. **Chi-Square Value ($\chi^2 = 17.21$)**:
    - A chi-square value of 17.21 indicates that there is a measurable difference between the observed and expected frequencies of PMS status across BMI categories.
    - The magnitude of the χ^2 value suggests that the relationship between BMI and PMS status is notable.
2. **Degrees of Freedom (df = 4)**:
    - With 4 degrees of freedom (based on three BMI categories minus one), the test accounts for the variability within the data while evaluating the association.
3. **P-Value (p = 0.0018)**:
    - The p-value is below the significance threshold of 0.05, meaning the result is statistically significant.
    - This implies there is evidence to suggest an association between BMI and PMS status in the population.
4. **Sample Size (N = 160)**:
    - A sample size of 160 provides robust statistical power, reducing the likelihood that the significant result is due to chance.
    -

Interpretation

The significant p-value (0.0018) indicates a meaningful relationship between BMI and PMS prevalence. While statistical significance does not prove causation, it highlights that BMI may influence the likelihood of experiencing PMS.

Discussion

This study aimed to explore the relationship between BMI and PMS in young women. The findings indicated that PMS prevalence was higher among individuals with normal BMI (48.75%) compared to those who were underweight or overweight/obese. This trend aligns with previous research that suggests a link between BMI and the regularity of ovulatory cycles, which may contribute to the development of PMS [5][10].

Normal Weight and PMS:

Normal weight individuals are more likely to experience regular ovulatory cycles, which result in the production of progesterone, a hormone linked to PMS [4][5][10]. Menstruation typically requires a minimum of 22% body fat. [11]. In contrast, underweight and overweight/obese individuals are more prone to irregular or anovulatory cycles, reducing their exposure to the hormonal fluctuations that cause PMS. This is consistent with findings from Mizgier et al. (2019), who reported a similar association between BMI and PMS severity [10]. Studies by

Peaistein et al. (2000) [12] and Serfaty et al. (1995) [13] have also emphasized the role of hormonal imbalances in the development of PMS symptoms. Moreover, Progesterone fluctuations in normal-weight individuals may influence neurotransmitters like serotonin and gamma-aminobutyric acid (GABA), both of which play a key role in mood regulation and PMS symptoms.

Behavioral and Somatic Symptoms:

The most common behavioral symptom reported in our study was irritability (68.75%), with the highest prevalence in normal BMI individuals. Depression (38.75%) was the second most reported behavioral symptom, in line with findings from Antai et al. (2004) [14]. The most frequently reported somatic symptom was headache (66.25%), which has also been highlighted in several other studies [14].

In our study, abdominal bloating is the second most dominant symptom which aligns with other studies [15,16]. However slight differences among other symptoms may be attributed to cultural differences in symptom reporting or the study population's unique characteristics [17].

Severity of PMS:

Normal BMI individuals also showed a higher prevalence of severe PMS (9.37%). This finding underscores the link between BMI and PMS severity, as suggested by our chi square test analysis, which showed that the association was statistically significant ($p = 0.0018$). Research by Bakhshani et al. (2009) found similar results, with the highest prevalence of severe PMS occurring in normal weight individuals [18].

Cross-Cultural Variation:

The prevalence of PMS varies across cultures. For instance, studies in Western populations report a higher prevalence of PMS, often as high as 85% [19], while non-Western countries, including Egypt and Saudi Arabia, report lower rates of 69.6% and 96.6%, respectively [20] [21]. Our findings are in line with this pattern, with a prevalence of 40.4%, similar to other non-Western studies [22]. The frequency distribution of PMS cases, as measured by ACOG, was categorized as 60.6% mild, 28.75% moderate, and 10.62% severe. However, this pattern differs from the other studies likely due to cultural, ethnic, and geographical variations.

Limitations:

- The study was conducted among a homogenous group of medical students, which may limit generalizability. Future research should include a more diverse population.
- The use of retrospective questionnaires may introduce recall bias. Prospective studies with real-time symptom tracking could provide more accurate data.
- The cross-sectional design prevents establishing causality. Longitudinal studies are needed to confirm the association between BMI and PMS.
- Potential confounding factors such as diet, physical activity, and genetic predispositions were not accounted for. Future research should adjust for these variables.

Despite these limitations, the study provides valuable insights into the association between BMI and PMS, highlighting the need for further research in this area.

Conclusion

This study investigated the association between Body Mass Index (BMI) and the prevalence and severity of Premenstrual Syndrome (PMS) among medical students. The findings revealed that PMS was more prevalent among individuals with a normal BMI, with the highest incidence of severe PMS observed exclusively in this group. Conversely, underweight and overweight individuals exhibited a lower prevalence of PMS.

The study highlights that hormonal fluctuations associated with regular ovulatory cycles are likely a contributing factor to PMS development, particularly in individuals with normal BMI. Given the significant prevalence of PMS, further research is warranted to better understand its underlying mechanisms, improve diagnostic accuracy, and optimize treatment strategies. Mental health assessment should be an integral part of PMS management, with appropriate referrals for psychological support as needed.

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References

1. World Health Organization. Controlling the global obesity epidemic. Available at: WHO Global Obesity Epidemic.
2. Arati M, Mesquita J (2023) Association of Premenstrual Syndrome with Body Mass Index and its Effect on Quality of Life: A Cross-sectional Study. JSAFOG.
3. Centers for Disease Control and Prevention (CDC). (2023).New CDC Data Show Adult Obesity Prevalence Remains High.
4. Green LJ, O'Brien PMS, Panay N Craig M (2017) Management of premenstrual syndrome. BJOG 124:e73–e105.
5. Yonkers KA, O'Brien PMS, Eriksson E (2008) Premenstrual syndrome. Lancet 371: 1200–1210.
6. Mishell DR (2005) Premenstrual disorders: Epidemiology and disease burden. Am J Managed Care 11(Suppl): S473.
7. Diagnostic and statistical manual of mental disorders-DSM-IV-TR (4th ed, Text Revision). Washington DC: American Psychiatric Association, 2000.
8. American College of Obstetrics and Gynecology: ACOG practice bulletin: premenstrual syndrome. Practice Guideline 95: 1-9.
9. .NHLBI (2022). Body Mass Index Calculator. Available at: NHLBI website.
10. Mizgier M, Jarzabek-Bielecka G , Jakubek E, Kedzia W (2019) The relationship between body mass index, body composition and premenstrual syndrome prevalence in girls. Ginekol pol 90: 256-261.
11. Shaws textbook of gynaecology 16th edition, chapter 23 amenorrhea page no 323.
12. .Peaistein T (2007) Prevance, impact on morbidity, and disease burden.in:O'Brien PM, Rapkin Aj, Schmi PJ, editors. The Premenstrual syndromes:PMS and PMDD.Boca Raton,FL,USA:CRC Press 37-47.

13. Serfaty D, Magneron AC (1997) Premenstrual syndrome in France. Epidemiology and therapeutic effectiveness of 1000 mg of micronized purified flavonoid fraction in 1473 gynecological patients. Contracept Fertil Sex 25:85-90.
14. Antai B, Udezi W, Ekanem A, Okon J, Umoiyoho U (2004) Premenstrual Syndrome: Prevalence In Students Of The University Of Calabar, Nigeria. Afr J Biomed Res 7: 45 -50.
15. Tabassum S, Afridi B, Aman Z, Tabassum W, Durrani R (2005) Premenstrual syndrome: Frequency and severity in young college girls. J Pak Med Assoc 55: 546-549.
16. Khella AK.(1992) Epidemiologic study of premenstrual symptoms. J Egypt Public Health Assoc 67: 109-118.
17. Dean BB, Borenstein JE, Knight K, Yonkers K. (2006) Evaluating the criteria used for identification of PMS. J Womens Health 15:546-555.
18. Bakhshani, N, Mousavi, M, Khodabandeh G (2009) Prevalence and severity of premenstrual symptoms among Iranian female university students, J Pak Med Assoc 59:205.
19. World Health Organization (1981) A cross-cultural study of menstruation: implications for contraceptive development and use. Studies in Family Planning 12: 3-16.
20. El -Defrawi MH, Lotfi G, Mahfouz R (1990) Late luteal phase dysphoric disorder, Do we need another psychiatric category? Egyptian Journal of Psychiatry 13:205-212.
21. Rasheed P, Al-Sowielem LS (2003) Prevalence and predictors of premenstrual syndrome among college-aged women in Saudi Arabia. Ann Saudi Med 23:381.
22. Steiner M, Born L (2000) Diagnosis and treatment of premenstrual dysphoric disorder: an update. Int Clin Psychopharmacol 15 Suppl 3: S5-17.