***Original Research Article***

**"** Comparative Analysis of Blood Pressure Variations during the Follicular and Luteal Phases of the Menstrual Cycle among Teachers with PMS**"**

**ABSTRACT**

**Background:** During the menstrual cycle, blood pressure (BP) may vary, and these changes are driven by hormonal fluctuations, which may worsen symptoms in women with PMS. Teachers were selected for this study because they are a highly stressed-out, emotionally demanding job as well as strict schedules that can effect BP regulation. Since educationalists play an important role in society, it is essential to understand these variations, and health interventions must be targeted accordingly.

**AIM:** This study aimed to compare blood pressure variations during the follicular and luteal phases of the menstrual cycle among women with PMS and examine the association between PMS severity and BP changes.

**Methods:** A cross sectional comparative study was carried out among 100 teachers diagnosed with PMS. Assessment of Baseline Characteristics, Including Age, Menstrual History, and Dietary Patterns. Blood pressure (BP) was measured in the follicular (phase 1) and luteal (phase 2) phases. The association of PMS severity with variation in BP group was analysed using paired t-test and chi-square tests.

**Results:** Most of the participants (43%) aged 33–37 years and 75% were married. At 86% reported having a family history of PMS. The mean SBP in the follicular and luteal phases were 117.50 mmHg (SD = 4.42) and 129.02 mmHg (SD = 4.80) respectively, with a significant increase (p < 0.001) in the luteal phase. Similarly, mean DBP increased from 79.84 mmHg (SD = 2.69) to 85.38 mmHg (SD = 3.10), (p < 0.001). The PMS severity during the luteal phase correlated positively with SBP (r = 0.809, p < 0.001) and DBP (r = 0.633, p < 0.001). In the luteal phase, PMS severity was associated with hypertensive BP levels, as assessed by chi-square analysis (SBP: χ² = 47.395, df = 4, p < 0.001; DBP: χ² = 13.880, df = 4, p = 0.008).

**Conclusion:** The increase in BP in the luteal phase was significant, and the association between the severity of PMS and hypertensive BP level was stronger. Our findings suggest that there is a clear need for designing interventions targeted towards the management of BP variations during the PMS phase, so as to mitigate the distress in working women during PMS.

**Keywords:** Premenstrual syndrome, Blood pressure change, Menstrual cycle phases, 1Teachers, Occupational stress

Introduction

Blood pressure is under complex physiological control, including through hormonal courses. In females, these sex-specific alterations are evident throughout the menstrual cycle and influence cardiovascular dynamics. Research shows that blood torsion levels are higher in the luteal phase than in the follicular phase, possibly due to increased sympathetic nervous system activity and fluid retention.1 This variation has substantial clinical significance, especially in women who suffer premenstrual syndrome (PMS), a luteal-phase occurrence of psychiatric and somatic symptoms that resolve with menses. 2

Premenstrual syndrome (PMS) is prevalent among women of reproductive age, and symptoms can vary from mild discomfort to serious distress that impacts daily activity and job performance. 3 It is a complex disorder with multisystem dysfunction, including hormonal indices, dysregulation of neurotransmitters, inflammation, and abnormal cardiovascular function4 One of these has been increasing attention on blood pressure variations as an underlying factor for PMS and, in some studies, increased risk of developing hypertension in PMS patients. There was also a report of increasing hypertension in young women. 1 Our understanding of blood pressure alterations throughout the menstrual cycle and implication to hypertension is relatively poor.5

The hypothalamic-pituitary-ovarian (HPO) axis dictates the menstrual cycle, which hits two main phases, estrogen-dominant follicular and progesterone-surge luteal. These hormonal and physical changes affect the vascular tone, fluid volume, and autonomic nervous system regulation, all leading to changes in blood pressure.6Although some studies have indicated a direct link between hormonal fluctuations and cardiovascular responses, results are inconsistent and further empirical investigation is warranted.7

Given the considerable stress experienced by teachers in the workplace, possibly leading to hormonal imbalance and aggravating PMS symptoms, the focus population for the present study was determined to be this group. Anyone working in the profession knows it is one of the most stressful jobs there are, with heavy workloads, lengthy working days and the emotional work of handling student behaviour.8 Chronic occupational stress in educators has been shown to affect autonomic nervous system function, menstrual cycle regulation, and blood pressure fluctuations. 9 These compelling factors deem female teachers an important population in exploring the relationship between PMS, cardiovascular function, and occupational stress. The fact that stress-induced variations in some hormones, mainly cortisol and catecholamines, modulate vascular resistance and blood pressure regulation suggests that this group is somehow able to give a particular view of particular occupational health sex risks, the so-called multiple work and family responsibilities as well as the fight for women's professional space and career competition.

This association between PMS and hormonal fluctuations has been suggested to play a pivotal role in blood pressure control, thus warranting investigation into how blood pressure varies throughout the menstrual cycle cycle, especially in women with PMS. A greater understanding of these differences could better inform clinical management of PMS-related cardiovascular symptoms and hypertension risk over time.

Using standardized measurements and effective statistical analysis, this study investigates the changes in systolic and diastolic blood pressure between the follicular and luteal phases in women with premenstrual syndrome (PMS). It seeks to enhance our knowledge of the effect of hormonal changes on cardiovascular adaptation by filling in gaps in the current literature. The findings may help inform clinical focus on health risks associated with PMS and support more individualized care for women. Because the data are scarce on whether and how these changes differ by population and job settings, this study also emphasizes the need for more extensive research in diverse groups. This study contributes to women's heart health by providing a clear comparison of blood pressure differences across the menstrual cycle. They can help inform guidelines on blood pressure monitoring frequency to drive more effective and personalized health care approaches.

**Statement of the Problem**

Comparative Analysis of Blood Pressure Variations during the Follicular and Luteal Phases of the Menstrual Cycle among teachers with PMS in selected schools at Kalaburagi

**Objectives**

* To compare blood pressure levels between the follicular and luteal phases of the menstrual cycle among women with PMS.
* To assess the severity of PMS symptoms during the follicular and luteal phases of the menstrual cycle.
* To determine the correlation between blood pressure variations and the severity of PMS symptoms across the menstrual cycle phases.
* To find the association of severity of PMS with blood pressure variations during the menstrual cycle phases among women with PMS.

**Assumption**

 Blood pressure variations occur naturally across different phases of the menstrual cycle and are measurable among women with premenstrual syndrome (PMS).

Women experiencing PMS exhibit distinct physiological, psychological, and behavioural symptoms that vary in severity between the follicular and luteal phases.

The variations in blood pressure across the menstrual cycle are correlated with the severity of PMS symptoms, suggesting a physiological link between cardiovascular function and PMS.

women with more severe PMS symptoms experience greater blood pressure fluctuations during the menstrual cycle compared to those with milder symptoms.

**Hypothesis**

There is a significant difference in blood pressure levels between the follicular and luteal phases of the menstrual cycle among women with PMS.

The severity of PMS symptoms differs significantly between the follicular and luteal phases of the menstrual cycle.

There is no significant correlation between blood pressure variations and the severity of PMS symptoms.

There is no significant difference in blood pressure fluctuations during the menstrual cycle between women with severe PMS symptoms and those with milder symptoms.

## **Materials and Methods**

This study used a descriptive cross-sectional research design to compare blood pressure variations between the follicular and luteal phases of the menstrual cycle among women with PMS in government, private, and aided schools in Kalaburagi from June to September 2022. The study was approved by the Ethics Committee of ESIC Medical College and Hospital, Kalaburagi.

### Sampling and Participants

Cluster random sampling was used to select participants. Written informed consent was obtained from all participants, ensuring confidentiality. The study included women aged 22 to 49 years with regular menstrual cycles and a Premenstrual Symptoms Screening (PMSS) score above 40. Women diagnosed with conditions like polycystic ovarian disease (PCOD), lactation amenorrhea, pelvic inflammatory diseases, diabetes, or hypertension were excluded. Additionally, those using oral contraceptives, smoking, consuming alcohol, or engaging in intense exercise were not included to minimize factors affecting blood pressure and PMS symptoms.

### Data Collection and Measures

Participants were screened using a structured tool and a self-administered questionnaire that collected demographic details, including age, place of residence, education level, marital status, type of institution, monthly income, age at menarche, menstrual cycle duration, family history of PMS, dietary habits, and food cravings. PMS severity was assessed using a standardized Premenstrual Symptom Scale.

Blood pressure was measured using a digital blood pressure monitor. To ensure accuracy, readings were compared with a Richter mercury sphygmomanometer on 10 individuals, and the Pearson correlation coefficient was calculated. The digital monitor’s accuracy was periodically verified throughout the study.

### Study Procedure

A total of 75 schools were selected in Kalaburagi, with 25 from each category (private, government, and aided). Teachers from these schools were invited to participate, and 300 were initially screened for PMS. Of these, 258 returned the screening tool, and 180 were identified as having PMS. Among them, 100 met the inclusion criteria and were selected for the study.

Blood pressure measurements were recorded for the 100 teachers diagnosed with PMS during two phases of their menstrual cycle: two days before menstruation (luteal phase) and two days after menstruation (follicular phase). Measurements were recorded on the right arm after a 10-minute rest, with the cuff positioned 1–2 cm above the elbow. Systolic and diastolic blood pressure readings were documented. These measurements were repeated during the first and fourth menstrual cycles to assess variations between the two phases.

### Statistical Analysis

Data were analyzed using SPSS 26, employing the following statistical tests:

* **Paired sample t-test** to compare blood pressure readings between the follicular and luteal phases.
* **Chi-square test** to analyze categorical variables, including sociodemographic factors and PMS severity.
* A **significance level of P < 0.05** was considered for all statistical analyses.

**RESULTS:**

The baseline characteristics of the study participants (N=100) provide key demographic and health-related insights. The majority of participants (43%) belonged to the age group of 33 –37 years, followed by 28–32 years (22%) and 38–45 years (25%), with the least representation from the 22–27 age group (10%). Regarding educational status, 27% had a BSc/B Ed degree, 24% held an MSc/MEd, 21% completed BA/B Ed, and 22% had MA/MEd qualifications, while 6% belonged to other categories. A significant proportion (75%) were married, while 25% were unmarried. Institutional affiliation showed a nearly even distribution among government (37%), private (34%), and aided (29%) schools.

Monthly income varied, with 39% earning between ₹25,001–₹35,000, followed by 26% in the ₹15,001–₹25,000 range, and 17% earning ₹35,001–₹40,000. Only 10% earned ₹40,001 or more, while 8% had an income of ₹15,000 or less. The majority of participants (58%) reported experiencing menarche between 13–16 years, with 27% at ≤13 years and 15% at ≥16 years.

Menstrual cycle duration varied, with the majority (57%) reporting a 28-day cycle, while 23% had a 24-day cycle, and 10% each had either a 23-day or 35-day cycle. A notable 86% of participants had a family history of premenstrual syndrome (PMS), with mothers being the most frequently affected (52%), followed by grandmothers (14%), aunts (11%), and sisters (9%).

Dietary patterns revealed that 60% followed a mixed diet, 24% were vegetarians, and 16% were non-vegetarians. Food cravings were prevalent among 83% of participants, with sweets (54%) being the most commonly craved item, followed by sour foods (10%), spicy foods (9%), dark chocolates (6%), and salty foods (4%). No participants reported craving beverages.

Fig :1 Pie diagram :01 showing PMS Severity Distribution during the Follicular Phase and luteal phase

Fig 2 The cone diagram showing blood pressure variation during the follicular phase

Fig 3 The cone diagram showing blood pressure variation during the luteal phase

**Table 1 :** Blood Pressure Variations During the Follicular and Luteal Phases of the Menstrual Cycle

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| **Phase** |

 |

|  |
| --- |
| **BP Type** |

 | **N** | **Minimum** | **Maximum** | **Mean** | **Std. Deviation** |
| Follicular Phase | Systolic BP (mmHg) | 100 | 107 | 127 | 117.50 | 4.42 |
| Diastolic BP (mmHg) | 100 | 73 | 85 | 79.84 | 2.69 |
| Luteal Phase | Systolic BP (mmHg) | 100 | 117 | 139 | 129.02 | 4.80 |
| Diastolic BP (mmHg) | 100 | 79 | 91 | 85.38 | 3.10 |

The comparative analysis of blood pressure variations across the follicular and luteal phases of the menstrual cycle reveals notable differences. During the follicular phase, the mean systolic blood pressure (SBP) was 117.50 mmHg (SD = 4.42), ranging from 107 to 127 mmHg, while the mean diastolic blood pressure (DBP) was 79.84 mmHg (SD = 2.69), with values ranging from 73 to 85 mmHg.

In the luteal phase, there was a marked increase in blood pressure readings. The mean SBP rose to 129.02 mmHg (SD = 4.80), with a range of 117–139 mmHg, while the mean DBP increased to 85.38 mmHg (SD = 3.10), with values ranging from 79 to 91 mmHg. These findings indicate a significant elevation in both systolic and diastolic blood pressure during the luteal phase compared to the follicular phase, suggesting potential physiological influences of hormonal fluctuations on cardiovascular parameters. This variation may have clinical implications, particularly for individuals prone to premenstrual hypertension or related cardiovascular concerns.

Table 2 : Showing Comparative Analysis of Blood Pressure Between Follicular and Luteal Phases of the Menstrual Cycle

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Blood Pleasure  | MeanFollicular Phase | MeanLuteal Phase | Mean Difference  | SD  | tvalue | df  | p-value | 95% Confidence Interval |
| Systolic BP(mmHg) | 117.50 | 129.02 | -11.52 | 0.73 | -157.50 | 99 | <0.001 | -11.665 to -11.375 |
| Diastolic BP (mmHg) | 79.84 | 85.38 | -5.53 | 0.40 | -136.10 | 99 | <0.001 | -5.617 to -5.456 |

The paired sample t-test was conducted to compare systolic and diastolic blood pressure between the follicular and luteal phases of the menstrual cycle. The results indicate a statistically significant increase in both systolic and diastolic blood pressure during the luteal phase. The mean systolic blood pressure increased from 117.50 mmHg (SD = 0.73) in the follicular phase to 129.02 mmHg in the luteal phase, with a mean difference of -11.52 mmHg (t = -157.50, df = 99, p < 0.001). The 95% confidence interval for the mean difference ranged from -11.665 to -11.375, confirming a significant rise. Similarly, the mean diastolic blood pressure increased from 79.84 mmHg (SD = 0.40) in the follicular phase to 85.38 mmHg in the luteal phase, with a mean difference of -5.53 mmHg (t = -136.10, df = 99, p < 0.001). The 95% confidence interval for the mean difference ranged from -5.617 to -5.456, reinforcing the significance of the increase. These findings suggest a consistent elevation in blood pressure during the luteal phase, which may be attributed to hormonal fluctuations associated with the menstrual cycle. The results highlight the potential need for monitoring blood pressure changes in women experiencing premenstrual symptoms, particularly those at risk of hypertension.

**Table 3 :** Showing Comparative Analysis of Premenstrual Syndrome (PMS) Scores Between Follicular and Luteal Phases

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PHASE  | MeanPMS Score | Mean Difference  | Paired Difference of SD | Standard Error | tvalue | df  | p-value | 95% Confidence Interval |
| Follicular Phase | 129.98 | -16.470 | 3.182 | 0.318 | -52.106 | 99 | <0.001 | -17.211 to -15.949 |
| Luteal Phase | 146.56 |

A paired sample t-test was performed to assess the difference in PMS scores between the follicular and luteal phases of the menstrual cycle. The results indicate a significant increase in PMS scores during the luteal phase. The mean PMS score was **129.98 (SD = 3.182)** in the follicular phase, which increased to **146.56** in the luteal phase. The mean difference of **-16.470 (SD = 3.182)** was statistically significant (**t = -52.106, df = 99, p < 0.001**). The **95% confidence interval for the mean difference ranged from -17.211 to -15.949**, confirming the reliability of the observed increase. These findings suggest that PMS symptoms intensify during the luteal phase, aligning with existing evidence that hormonal fluctuations during this phase exacerbate premenstrual symptoms. The results emphasize the importance of interventions targeting symptom management, particularly for women experiencing severe PMS-related disturbances in daily functioning.

**Table 4 :** Showing Correlation Between Premenstrual Syndrome (PMS) Scores and Blood Pressure During Follicular and Luteal Phases

|  |  |  |  |
| --- | --- | --- | --- |
| Phase  | Variable | Pearson Correlation R | p-value |
| Follicular Phase | PMS Score & Systolic BP  | 0.787 | < 0.001 |
| PMS Score & Diastolic BP | 0.614 | < 0.001 |
| Luteal Phase | PMS Score & Systolic BP  | **0.809** | < 0.001 |
| PMS Score & Diastolic BP | 0.633 | < 0.001 |

The results indicate a strong positive correlation between PMS scores and systolic blood pressure across both menstrual phases, with a slightly higher correlation observed in the luteal phase (r = 0.809, p < 0.001) compared to the follicular phase (r = 0.787, p < 0.001). This suggests that as PMS severity increases, systolic blood pressure tends to rise, with a more pronounced effect during the luteal phase, likely due to hormonal fluctuations. Similarly, a moderate but significant positive correlation was found between PMS scores and diastolic blood pressure, with the correlation being slightly stronger in the luteal phase (r = 0.633, p < 0.001) than in the follicular phase (r = 0.614, p < 0.001). These findings highlight a consistent association between PMS severity and blood pressure regulation, with systolic BP showing a stronger relationship compared to diastolic BP.

**Table 5:** Showing Association between PMS severity and systolic Blood Pressure categories during Follicular and Luteal Phases

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| PHASE | PMS Severity | Normal BP | ELEVATED | HYPERTENSIVE | χ² df | Cramér’s V | P value  |
| Follicular  | Moderate  | 19 | 7 | NIL | 14.562 df 2 | 0.382 | 0.001 |
| Sever  | 54 | 18 | NIL |
| Very Sever | 1 | 1 | NIL |
| **Total** | **74** | **26** | **NIL** |
| Luteal  | Moderate  | 1 | 4 | 5 | 47.395df 4 | 0.688 | < 0.001 |
| Sever  | 4 | 31 | 31 |
| Very Sever | 1 | 12 | 11 |
| **Total** | **6** | **47** | 47 |

A chi-square test revealed a significant association between PMS severity and systolic BP across both menstrual phases. In the **follicular phase (χ² = 14.562, df = 2, p = 0.001)**, the relationship was moderate, indicating that while PMS severity influenced BP, its effect was not very pronounced. However, in the **luteal phase (χ² = 47.395, df = 4, p < 0.001)**, the association was stronger, with a higher number of participants experiencing elevated and hypertensive BP as PMS severity increased. This suggests that PMS-related physiological changes have a **greater impact on systolic BP during the luteal phase**, aligning with the known effects of hormonal fluctuations on cardiovascular regulation.

**Table 6:** Showing Association between PMS severity and Diastolic Blood Pressure categories during Follicular and Luteal Phases

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| PHASE | PMS Severity | Normal BP | Elevated | Hypertensive | χ² df | Cramér’s V | P value  |
| Follicular  | Moderate  | 16 | 9 | NIL | 21.722 df 2 | 0.466 | < 0.001 |
| Sever  | 46 | 27 | NIL |
| Very Sever | - | 01 | NIL |
| **Total** | **63** | **37** | **NIL** |
| Luteal  | Moderate  |  | 9 | 01 | 13.880df 4 | 0.373 | < 0.008 |
| Sever  | 02 | 65 | 06 |
| Very Sever | 01 | 15 | 01 |
| **Total** | **03** | **89** | 08 |

A chi-square test demonstrated a significant association between PMS severity and **diastolic blood pressure (DBP)** across menstrual phases. In the **follicular phase (χ² = 21.722, df = 2, p < 0.001),** individuals with severe PMS were more likely to have elevated DBP, though none were classified as hypertensive. The association was stronger in the **luteal phase (χ² = 13.880, df = 4, p = 0.008),** where a notable shift toward elevated and hypertensive DBP was observed as PMS severity increased. This indicates that diastolic pressure is more impacted in the luteal phase, possibly due to heightened autonomic and vascular responses linked to hormonal fluctuations.

**DISCUSSION**

Premenstrual syndrome (PMS) is a common condition that encompasses a range of physical, emotional and behavioral symptoms which manifest during the luteal phase of the menstrual cycle and subside after menstruation. The intensity of PMS ranges from mild to severe, and some people find that their day-to-day life suffers as a result, including their work and social engagement. Its appearance at this time of month is believed to be due to the hormones estrogen and progesterone, and emerging evidence indicates that PMS may also be associated with changes in physiology, for example changes in blood pressure with potential cardiovascular effects. Since PMS has been associated with both symptomatic and long-term health impairment, the current study sought to assess PMS severity in relationship to blood pressure variability over the menstrual cycle with respect of demographic and lifestyle characteristics in relation to symptomatology expression.

This study was conducted between teachers which confirmed that PMS was predominantly diagnosed in women in their 30s (Osborn et al., 2020), with most of the participants (43%) being in the age group 33–37 years old. 10 In addition, given that the study cohort was well-educated, this factor has previously been related to higher levels of awareness and PMS symptom reporting Saraei et al,who found that more educated nurses were more aware of PMS and reported it more often. 11 Most of the participants (75%) were married similar with the findings of Simarjeet et al. showing that marital status has an effect on premenstrual symptoms and married women reporting more emotional and physical distress. 12This is likely due to added responsibilities and sources of stress associated with marriage, affecting symptom perceptions and severity. The results show that the majority of the participants (58%) had their menarche between the ages of 13–16 years which is in agreement to the study conducted by Ramraj et al. mentioned generational differences and correlating factors in menarcheal age. 13

Participants reported different durations of menstrual cycles, and the most common cycle observed among them was a 28-day cycle (57%), followed by 24-day (23%), and 10% were experiencing either a 23-day or 35-day cycle. These results are in agreement with Apple Women’s Health Study Team results showing that the duration of a menstrual cycle can vary according to factors like age, weight, race, and ethnicity. OHVL's study through similar physiological causes and lifestyle factors and observed that while 28 days cycles are common, shorter and longer ones are also quite common. 14 The presence of participants with 23-day and 35-day cycles among participants in the present study supports ovulatory cycles are not uniform and can be influenced by individual medical conditions and demographic characteristics. These differences highlight the importance of individualized menstrual health evaluations and the recognition of cycle irregularity.

The high percentage (86%) of participants with family history of PMS, with mothers (52%) being the most affected, supports the inherited basis of PMS. Bemina & Mathias presented a contribution on familial correlations in PMS severity, reinforcing the involvement of genetic and shared environmental factors in symptom expression. 15 Similarly, Lakshmi et al. reported that PMS is prevalent among women of reproductive age and may be influenced by a strong family history. 16 60%of subjects followed a mixed diet, 24% were vegetarians and 16% were non-vegetarians in dietary patterns of current study. Ghosh et al. (2023) study demonstrated that dietary habits are involved in the severity of PMS, as they reported that the intensity of PMS symptoms varies between vegetarian and non-vegetarian women. 17Their study also implies that diet composition, and more specifically the difference in nutrient intakes, may affect hormonal equilibrium and the symptoms of PMS. These combined dietary patterns emphasize the importance of an adequate intake of nutrient-rich foods that contain various vitamins and nutrients associated with preventing PMS symptoms (24).

Food cravings were frequent in 83% of participants: sweets (54%) were the most craved item. Hantsoo et al. (2022) also shared that cravings for sweets are also another important premenstrual symptom and that is likely due to hormonal changes altering serotonin levels. 18The previously observed high occurrence of sweet cravings in both studies supports a role of PMS-related neurobiological mechanisms in changing food preferences.

The data from this study shows a statistically significant rise in both systolic and diastolic blood pressure in the luteal phase as compared to the follicular phase, with mean SBP taking a jump from116.68 mmHg to 131.56 mmHg (p < 0.001) and mean DBP moving from 80.53 mmHg to 85.08 mmHg (p < 0.001). These findings are consistent with that of Singh et al. (2024) which also investigated large changes in blood pressure detection across menstrual phases, attributing the increase in the luteal phase to hormonal alterations in a cycle with a focus on progesterone and oestrogen variations. 19

The findings of the present study show a significant increase in PMS scores in the luteal phase compared to the follicular phase, with mean PMS scores rising from 129.98 to 146.56 (p < 0.001). Such finding is consistent with the study by Henz et al. (2018), which also reported an aggravation of PMS during the luteal phase, assessed with validated tools such as the DRSP and PSST. 20

Our study showed a significant positive correlation between PMS scores and systolic blood pressure (SBP) for both the follicular (r = 0.787, p < 0.001) and luteal phases (r = 0.809, p < 0.001). Likewise, moderate positive correlations were observed between PMS scores and DBP during both phases (r = 0.614 and r = 0.633, respectively, p < 0.001). The current findings suggest that higher PMS scores predict higher blood pressure across the menstrual cycle period, highlighting a physiological relationship between the cardiovascular response and PMS severity across the cycle. However, a comparison is made with those of Kulshreshtha et al. (2021), that their study showed no significant differences in SBP and DBP between follicular and luteal phases. 21 Cases SBP elevated from 115.91 ± 7.30 mmHg during the follicular phase to 117.08 ± 6.77 mmHg during the luteal phase, and DBP increased slightly from 74.41 ± 5.98 mmHg to 75.25 ± 5.10 mmHg (P < 0.001 for both). These changes were not markedly different from the control group in which both SBP and DBP levels were stable across both phases. These two studies differ substantially, suggesting that PMS does indeed contribute to blood pressure, but that the magnitude of the effect depends on the subject matter, the blood pressure measurement method and the severity of PMS.

Individuals with more severe PMS were found to have higher systolic and diastolic BP values when compared to women with less severe PMS (systolic BP: χ² = 47.395, df = 4, p < 0.001; diastolic BP: χ² = 13.880, df = 4, p = 0.008), with significant associations upon stratifying analysis for all menstrual phases, but with a considerably stronger association observed in the luteal phase of the cycle. A significant association was found during the follicular phase too, albeit with moderation effect (χ² = 14.562, df = 2, p = 0.001 for systolic BP; χ² = 21.722, df = 2, p < 0.001 for diastolic BP). Unlike Kulshreshtha et al., in their study they found no difference in systolic and diastolic BP between PMS cases and controls during the follicular or the luteal phases. However, the current study found a clear trend of increased and hypertensive BP in the severe cases of PMS, especially in the luteal phase. 21

This divergence suggests that PMS severity might play a crucial role in BP variations, which may not have been fully captured in the Kulshreshtha et al. study. The findings of the present study align more closely with Bertone-Johnson et al. (2016), which reported significantly higher diastolic BP in PMS cases (72.3 mmHg vs. 69.1 mmHg in controls, p = 0.02), with even greater elevations in women with severe PMS symptoms (77.7 mmHg, p = 0.007).22

The findings of this study underscore the significant variations in systolic and diastolic blood pressure across menstrual phases, particularly among individuals with severe PMS. The strong positive correlation observed between PMS scores and blood pressure highlights the physiological link between PMS severity and cardiovascular responses, emphasizing the role of hormonal fluctuations in vascular changes. These results further support existing literature suggesting that PMS may contribute to cardiovascular risk, particularly in women with a family history of the condition. The study also revealed that demographic factors such as age, education level, marital status, and dietary habits influence PMS severity, reinforcing the need for a holistic approach to symptom management.

**Conclusion**

Our study highlights a significant rise in blood pressure during the luteal phase among women with PMS, emphasizing the physiological influence of menstrual cycle hormones on cardiovascular function. The strong correlation between PMS severity and blood pressure variations suggests that targeted interventions may be necessary to prevent potential cardiovascular complications in this population. These findings contribute to the growing body of literature on menstrual cycle-related cardiovascular health and warrant further exploration in future studies. Future research should explore long-term cardiovascular implications and investigate targeted interventions, such as mindfulness-based cognitive therapy, to mitigate both the psychological and physiological burden of PMS.

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