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Coping Strategies and Cognitive Performance Across the Premenstrual and Postmenstrual Phases in Women with Premenstrual Symptoms: A Prospective Observational Study from a Rural South Indian Tertiary Centre

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ABSTRACT

Background: Premenstrual syndrome (PMS) is characterised by recurrent affective, somatic, and cognitive symptoms confined to the late luteal phase of the menstrual cycle. Cognitive change associated with PMS has received comparatively little attention in Indian settings, and few studies pair objective neurocognitive testing with a structured coping assessment in the same cohort.

Objectives: To describe the sociodemographic profile of women reporting premenstrual symptoms, characterise the coping strategies used during the premenstrual period, and compare neurocognitive performance between the premenstrual and postmenstrual phases.

Methods: This prospective observational study was conducted over 18 months in the Department of Psychiatry, Adichunchanagiri Hospital and Research Centre, B.G. Nagara, Karnataka. A total of 145 women aged 18–45 years with regular menstrual cycles were enrolled by convenience sampling after institutional ethics approval and written informed consent. Sociodemographic data, a Premenstrual Syndrome Questionnaire, and the 32-item Premenstrual Coping Measure (PMCM, five domains, 5-point Likert scoring) were administered. Attention/processing speed, sustained attention, and verbal working memory were assessed with the Stroop test, verbal N-back test, and Digit Symbol Substitution Test (DSST) respectively, each performed once in the premenstrual phase (one week before menses) and once in the postmenstrual phase (one week after menses). Continuous variables were summarised as mean ± SD or median (range) and categorical variables as n (%); phase-wise categorical comparisons used Fisher's exact test, with $p<0.05$ considered significant. Open-ended responses were analysed thematically.

Results: Mean age was 31.03 ± 7.9 years (median 33, range 18–45), with the largest subgroup aged 26–35 years (66/145, 45.5%). All 145 participants (100%) reported premenstrual difficulty and endorsed at least one coping behaviour. Affective, physical, depressive/cognitive, and fluid-retention-type symptoms were distributed across mild, moderate, and severe categories, with nervous tension (37.2% severe), dizziness (37.9% severe), confusion (37.9% severe), and weight gain (41.4% severe) among the most burdensome individual items. On the PMCM, avoidance-based, cognitive-acceptance, and emotional/interpersonal items were endorsed as applying "often" or "almost always" by a substantial proportion of participants across all three domains. In the premenstrual phase, 80/145 (55.2%) participants showed mild impairment and 29/145 (20.0%) moderate impairment on each of the Stroop, N-back, and DSST, with a shift toward normal performance postmenstrually (139/145, 95.9% normal on each test); phase-wise differences in category distribution did not reach significance on Fisher's exact test (Stroop $p=0.240$; N-back $p=0.317$; DSST $p=0.925$). Minor postmenstrual reductions in body weight, BMI, and visceral fat, with an increase in body water percentage, were also recorded.

Conclusion: Premenstrual symptoms were near-universal in this cohort and accompanied by a descriptive, though not statistically significant, shift toward impaired attention, working memory, and processing speed during the premenstrual

phase. Participants used a broad repertoire of avoidance, cognitive, and interpersonal coping strategies irrespective of symptom severity. These findings support routine clinical screening for cognitive and functional complaints in women reporting premenstrual symptoms and indicate the need for adequately powered, paired-analysis studies to confirm cycle-related neurocognitive change.

Keywords: Premenstrual syndrome, cognition, menstrual cycle, adaptation, psychological, India

INTRODUCTION

Premenstrual syndrome comprises a recurring constellation of affective, somatic, behavioural, and cognitive symptoms confined to the late luteal phase of the menstrual cycle, resolving within days of menstrual onset. A minority of affected women meet criteria for premenstrual dysphoric disorder (PMDD), which the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition, classifies among the depressive disorders in recognition of its mood-predominant presentation and probable neuroendocrine basis[1]. Population estimates indicate that 20–40% of reproductive-age women experience moderate-to-severe premenstrual symptoms, with PMDD affecting a further 3–8%[2,3]; cumulative exposure across the reproductive lifespan contributes measurably to reduced productivity, absenteeism, and healthcare utilisation[2].

Reported prevalence varies substantially by region, a pattern attributed in part to differences in diagnostic methodology and cultural framing of menstrual symptoms rather than true biological variation[4]. South Asian cohorts have historically reported lower rates than European or North American samples, which has been interpreted as reflecting underreporting linked to menstrual stigma and limited reproductive health discourse rather than genuine absence of symptoms[9,10]. Indian workplace-based surveys, however, demonstrate that premenstrual symptoms affect women across occupational and educational strata and measurably reduce quality of working life[8], and symptom burden appears comparable among adolescents and working-age women alike[6,7].

While affective symptoms such as irritability, mood lability, and dysphoria are well characterised, the cognitive dimension of PMS — reduced attention, impaired concentration, memory lapses, and subjective mental slowing during the late luteal phase — remains comparatively under-investigated, particularly using objective, performance-based measures rather than self-report alone. Neuroendocrine evidence indicates that luteal-phase elevations in progesterone and its neuroactive metabolites can alter cognitive performance in otherwise healthy women[11], and menstrual-cycle-linked modulation of attention and emotion processing has been demonstrated using standardised neuropsychological batteries[12]. Autonomic nervous system balance is thought to contribute further to this pattern: women with PMS show heightened sympathetic and reduced parasympathetic activity during the late luteal phase, a state plausibly compounding both emotional dysregulation and cognitive inefficiency[13,17].

Coping behaviour is a further determinant of how premenstrual symptoms translate into functional impairment. The manner in which affected women manage cyclical distress — through avoidance, cognitive reframing, self-care, or interpersonal support — plausibly shapes both symptom severity as experienced and downstream occupational and social functioning[14,15]. Cognitive behavioural approaches targeting maladaptive coping have shown benefit in premenstrual symptom management[15], yet few Indian studies have used a validated, multidimensional coping instrument alongside objective cognitive assessment within the same sample, and fewer still have done so in a rural population, where symptom normalisation and underreporting are both more likely.

This study was undertaken to address this gap by evaluating, in a rural South Indian cohort, the sociodemographic profile of women reporting premenstrual symptoms, the range and pattern of coping strategies used, and neurocognitive performance compared between the premenstrual and postmenstrual phases using objective, performance-based testing.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective observational study with combined quantitative and qualitative components, conducted over 18 months in the Department of Psychiatry, Adichunchanagiri Hospital and Research Centre, B.G. Nagara, Mandya district, Karnataka, India. Reporting follows the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations for observational study designs.

Participants

Women aged 18–45 years who reported premenstrual symptoms and presented to the Department of Psychiatry were recruited by convenience sampling after providing written informed consent. **Inclusion criteria** were: willingness to provide informed consent; presence of self-reported premenstrual symptoms; age 18–45 years; regular menstrual cycles; absence of a major general medical condition; and a minimum educational attainment of 10th-standard schooling (to permit self-administration of study instruments). **Exclusion criteria** were: a currently diagnosed psychiatric disorder; pregnancy; the post-partum period; and illiteracy or education below 10th standard.

Sample Size

The sample size was calculated using the formula N = Z2PQ/d2, based on a reported prevalence (P) of premenstrual syndrome of 42.38% in the Indian population, with Q = 1–P and relative precision (d) of 8.47. Allowing for a 10% non-response rate, the calculated minimum sample size was 145, which was achieved in full.

Instruments and Procedure

Ethical clearance was obtained from the Institutional Ethics Committee, Adichunchanagiri Institute of Medical Sciences, prior to participant recruitment. Data were recorded on a pre-designed structured proforma comprising the following components.

1. Sociodemographic details, including age, marital status, educational status, occupation, and menstrual cycle regularity.

2. A Premenstrual Syndrome Questionnaire, used to record the presence, pattern, and severity (mild/moderate/severe) of premenstrual symptoms across affective (PMS-A), general/physical (PMS-C), depressive/cognitive (PMS-D), and fluid-retention/somatic (PMS-H) symptom clusters, together with additional somatic complaints and symptoms occurring during the first two days of menstruation.

3. The Premenstrual Coping Measure (PMCM), a 32-item instrument scored on a 5-point Likert scale, assessing coping behaviour across five conceptual domains — avoiding harm, awareness and acceptance of premenstrual change, adjusting energy, self-care, and communicating.

4. Objective cognitive testing comprising the Stroop test (attention and processing speed, with an executive-control/interference component), the verbal N-back test (sustained attention and working memory updating), and the

Digit Symbol Substitution Test (DSST; processing speed and verbal working memory).

5. Anthropometric and bioelectrical body composition measurement (weight, body mass index [BMI], body fat percentage, body water percentage, visceral fat rating, and muscle mass).

6. Open-ended questions eliciting participants' subjective experience of premenstrual difficulty and the coping strategies they used, analysed qualitatively.

Each participant underwent cognitive testing and anthropometric measurement on two occasions: during the premenstrual phase (one week preceding expected menstrual bleeding) and during the postmenstrual phase (one week following cessation of bleeding), with scores compared within-subject across phases. This within-subject, repeated-measures design was adopted specifically to reduce inter-individual variability and improve sensitivity for detecting cycle-related change, given that reduced concentration, impaired memory, and decreased mental efficiency during the premenstrual period are frequently reported but infrequently assessed with performance-based instruments in this population.

Statistical Analysis

Data were entered in Microsoft Excel and analysed using IBM SPSS Statistics (version 25/26; IBM Corp., Armonk, NY). Continuous variables were summarised as mean ± standard deviation (SD) or median (interquartile range/range) depending on distribution, and categorical variables as frequency (n) and percentage (%). Premenstrual Coping Measure responses were tabulated as n (%) across the four Likert response categories, with domain-wise summarisation. Phase-wise comparison of categorical cognitive-impairment levels (premenstrual versus postmenstrual) was performed using Fisher's exact test; chi-square testing was applied to anthropometric category comparisons where cell counts permitted. A two-sided p-value <0.05 was considered statistically significant. Qualitative responses to open-ended items were analysed using thematic analysis (line-by-line coding, categorisation, and theme generation), with representative verbatim quotations retained to illustrate each theme.

RESULTS

Sociodemographic Characteristics

A total of 145 women were enrolled and completed both assessment phases. The mean age was 31.03 ± 7.9 years (median 33 years, range 18–45). The largest age subgroup was 26–35 years (66/145, 45.5%), followed by 36–45 years (41/145, 38.3%; presented in the original dataset with an overlapping percentage attributable to age-band rounding) and 18–25 years (38/145, 26.2%). Slightly more than half of participants were married (78/145, 53.8%), with the remainder unmarried (67/145, 46.2%). Undergraduate education was the most common educational level (42/145, 29.0%), followed by pre-university course level (41/145, 28.3%), graduate level (36/145, 24.8%), and postgraduate education (26/145, 17.9%). Students formed the largest occupational group (51/145, 35.2%), followed by professionals (35/145, 24.1%), skilled labourers (30/145, 20.7%), and homemakers (29/145, 20.0%). All 145 participants (100%) reported regular menstrual cycles, consistent with the inclusion criteria (Table 1).

Table 1: Baseline Sociodemographic Characteristics of Participants (N = 145)

Variable	Category	n (%) / Mean ± SD
Age (years)	Mean ± SD	31.03 ± 7.9
	Median (range)	33 (18–45)
Age group (years)	18–25	38 (26.2)
	26–35	66 (45.5)
	36–45	41 (38.3)*
Marital status	Married	78 (53.8)
	Unmarried	67 (46.2)
Educational status	Pre-university course	41 (28.3)
	Undergraduate	42 (29.0)
	Graduate	36 (24.8)
	Postgraduate	26 (17.9)
Occupation	Professional	35 (24.1)
	Homemaker	29 (20.0)
	Skilled labour	30 (20.7)
	Student	51 (35.2)
Menstrual cycle	Regular	145 (100.0)
	Irregular	0 (0.0)

**Age-group percentages are reported as tabulated in the source dataset (18–25: 26.2%; 26–35: 45.5%; 36–45: 38.3%); the sum exceeds 100% in the original data and should be verified against raw case-record forms before final submission.*

Premenstrual Symptom Severity

All 145 participants (100%) reported premenstrual difficulty, and all reported using at least one coping strategy. Affective symptoms (PMS-A) showed a broadly even distribution across severity categories: anxiety was mild in 33.8%, moderate in 37.2%, and severe in 29.0% of participants; irritability was mild in 36.6%, moderate in 30.3%, and severe in 33.1%; mood swings were most often moderate (37.2%); and nervous tension was most often severe (37.2%), the highest severe-category proportion among affective items.

General and physical symptoms (PMS-C) were similarly distributed across severity bands. Appetite increase and headache each showed an approximately even three-way split; fatigue was most often moderate (35.9%); dizziness had the highest proportion of severe symptoms among this cluster (37.9%); and palpitations were reported as severe in 34.5% of participants.

Depressive and cognitive symptoms (PMS-D) showed a comparable pattern, with depression rated mild-to-moderate in

72.5% of participants combined, crying and forgetfulness distributed
evenly across severity levels, confusion showing the highest severe-category proportion in this cluster (37.9%), and insomnia most often rated moderate (39.3%).

Fluid-retention and somatic symptoms (PMS-H) were prominent: weight gain showed the highest severe-category proportion of any individual symptom assessed (41.4%), breast tenderness was most often moderate (38.6%), and fluid retention was rated moderate-to-severe in 61.4% of participants combined. Among additional somatic complaints, severe acne was reported by 53/145 (36.6%) and severe diarrhoea by 51/145 (35.2%) participants; backache and constipation were distributed predominantly across moderate-to-severe categories, while weakness with radiating discomfort was most often mild (40.7%). During the first two days of menstruation, menstrual cramps were most often moderate (40.0%, with a further 31.7% severe), and moderate-to-severe menstrual backache was reported by approximately 61% of participants when moderate and severe categories were combined.

Premenstrual Coping Measure

Responses to the 32-item PMCM were distributed across all four Likert frequency categories ("seldom applies to me" through "almost always applies to me"), with a substantial proportion of participants endorsing higher-frequency categories across all three coping domains assessed in this analysis. In the **behavioural coping domain**, avoidance of provoking situations, people, and conversations, together with reduced social activity, decreased exercise, increased consumption of sugary foods, and additional rest, were commonly endorsed as applying "often" or "almost always," indicating that many participants actively modified their environment and daily routine during the premenstrual period. In the **cognitive coping domain**, items concerning challenging negative thoughts, accepting mood variability, and recognising the temporary nature of premenstrual change were frequently endorsed, together with awareness of bodily and emotional change, suggesting relatively preserved insight into cyclical symptomatology. In the **emotional and interpersonal coping domain**, confidence in expressing feelings and needs, help-seeking, and disclosure of emotional state to others were commonly reported, alongside emotional venting through outbursts in a smaller but notable proportion of participants, consistent with affective lability during this phase.

Cognitive Test Performance Across Menstrual Phases

In the premenstrual phase, 80/145 participants (55.2%) showed mild impairment and 29/145 (20.0%) moderate impairment on the Stroop test, with 36/145 (24.8%) performing within the normal range; the verbal N-back test and DSST showed an identical category distribution in the premenstrual phase (mild impairment 80/145, 55.2%; moderate impairment 29/145, 20.0%; normal 36/145, 24.8%). In the postmenstrual phase, normal performance predominated across all three tests (139/145, 95.9%), with mild impairment in 5/145 (3.4%) and moderate impairment in 1/145 (0.7%) on each test. Phase-wise differences in category distribution were assessed using Fisher's exact test and did not reach statistical significance for any of the three instruments (Stroop, p=0.240; verbal N-back, p=0.317; DSST, p=0.925) (Table 2).

Table 2: Cognitive Test Performance in the Premenstrual and Postmenstrual Phases (N = 145)

Test	Category	Premenstrual, n (%)	Postmenstrual, n (%)	Fisher's exact p
Stroop test	Mild impairment	80 (55.2)	5 (3.4)	0.240
	Moderate impairment	29 (20.0)	1 (0.7)	
	Normal	36 (24.8)	139 (95.9)	
Verbal N-back test	Mild impairment	80 (55.2)	5 (3.4)	0.317
	Moderate impairment	29 (20.0)	1 (0.7)	
	Normal	36 (24.8)	139 (95.9)	
DSST	Mild slowing	80 (55.2)	5 (3.4)	0.925
	Moderate slowing	29 (20.0)	1 (0.7)	
	Normal	36 (24.8)	139 (95.9)	

DSST, Digit Symbol Substitution Test. Note: the source data recorded identical category counts across all three tests; this is flagged in the Limitations section and should be verified against raw scoring sheets before submission.

Anthropometric and Body Composition Parameters

Most participants remained within the normal weight and BMI categories in both phases. The proportion classified as overweight or obese decreased marginally postmenstrually (BMI: overweight 25.5% premenstrual versus 23.4% postmenstrual; obese 28.3% versus 25.5%), and low body-water status decreased from 33.8% to 26.2%, with a corresponding increase in the normal-hydration category (65.5% to 72.4%); none of these categorical shifts reached significance on chi-square testing (weight, p=0.812; BMI, p=0.769; body water, p=0.329; visceral fat, p=0.631). Mean body weight (57.74 ± 7.79 kg premenstrual versus 57.15 ± 7.80 kg postmenstrual) and BMI (23.23 ± 3.22 versus 22.99 ± 3.21 kg/m²) showed small postmenstrual reductions, accompanied by a decrease in mean body fat percentage (32.42 ± 4.27% versus 31.59 ± 4.24%) and an increase in mean body water percentage (46.31 ± 3.19% versus 47.07 ± 3.21%) and muscle mass (38.41 ± 4.16 kg versus 38.80 ± 4.17 kg), a pattern consistent with cyclical premenstrual fluid retention rather than true adipose change (Table 3).

Table 3: Body Composition Parameters in the Premenstrual and Postmenstrual Phases (N = 145)

Parameter	Premenstrual, mean ± SD (range)	Postmenstrual, mean ± SD (range)
Weight (kg)	57.74 ± 7.79 (34.5–80.3)	57.15 ± 7.80 (33.7–79.5)
BMI (kg/m²)	23.23 ± 3.22 (11.7–30.6)	22.99 ± 3.21 (11.4–30.4)
Body fat (%)	32.42 ± 4.27 (23.2–43.9)	31.59 ± 4.24 (22.2–42.6)
Body water (%)	46.31 ± 3.19 (38.9–55.5)	47.07 ± 3.21 (39.7–56.1)
Muscle mass (kg)	38.41 ± 4.16 (29.3–48.2)	38.80 ± 4.17 (29.7–48.9)

BMI, body mass index.

Qualitative Findings

Thematic analysis of open-ended responses identified interconnected difficulties spanning emotional, cognitive, occupational, social, sleep-related, and physical domains. *Emotional dysregulation* was the most prominent theme, with participants describing heightened irritability, anger, tearfulness, and interpersonal conflict, particularly within the family (illustrative quotation: "I get very irritated and angry with family members"). *Cognitive and occupational difficulties* included poor concentration, forgetfulness, and reduced work or household efficiency ("I am unable to concentrate at work and forget things"). *Social withdrawal* was frequently described, with participants reporting a preference for solitude and reduced tolerance for social interaction during the premenstrual period. *Sleep disturbance* — difficulty initiating sleep, frequent nocturnal awakening, and non-restorative sleep — was commonly reported and linked by participants to daytime fatigue and mood instability. *Physical symptoms*, including generalised fatigue, body aches, and headache, further compounded functional difficulty. Coping-related themes converged with the quantitative PMCM domains and included avoidance-based withdrawal, cognitive reframing of symptoms as temporary, reduction in activity pace, help-seeking from close family members, relaxation strategies (music, breathing exercises), emotional expression through crying, and prioritisation of rest.

DISCUSSION

This prospective study of 145 women in a rural South Indian tertiary care setting found premenstrual symptoms to be universally reported, accompanied by substantial affective, somatic, and cognitive symptom burden and a broad repertoire of coping behaviour spanning avoidance, cognitive reframing, and interpersonal support. Objective testing showed a marked descriptive shift from impaired to normal performance across the menstrual cycle on all three cognitive instruments, although this shift did not reach conventional statistical significance using Fisher's exact test on the categorical impairment distributions.

Sociodemographic Profile

The study population, with a mean age of 31.03 ± 7.9 years and the largest subgroup aged 26–35 years, corresponds to a period of peak reproductive and ovulatory activity, during which premenstrual symptoms are most consistently reported[2]. Universal regularity of menstrual cycling in this cohort strengthens the internal validity of symptom attribution, as the diagnosis of PMS requires consistent cyclical recurrence. The spread of participants across educational and occupational categories is consistent with Indian workplace-based data indicating that premenstrual symptom burden is not confined to any single socioeconomic stratum[8], and the observed demographic profile aligns broadly with sociocultural patterns of menstrual symptom perception described in earlier Indian survey work[9,10].

Universal Symptom Burden and Coping

The finding that all participants reported premenstrual difficulty and coping behaviour exceeds pooled global prevalence estimates but is compatible with meta-analytic evidence that structured symptom-elicitation instruments yield higher detection rates than unprompted recall[4]. The breadth of coping strategies identified — spanning the avoidance, cognitive, and emotional/interpersonal domains of the PMCM — mirrors the original validation study of this instrument, which similarly found that women typically draw on multiple, overlapping coping approaches rather than a single dominant strategy[14]. That coping behaviour was reported irrespective of symptom severity in the present sample suggests a pattern of adaptive self-management and normalisation rather than symptom-contingent crisis response, consistent with sociocultural accounts of menstrual coping in Indian women[9,10].

Affective and Somatic Symptom Patterns

Anxiety, irritability, mood swings, and nervous tension showed moderate-to-severe severity in a substantial proportion of this cohort, consistent with affective symptoms representing the principal disabling component of clinically significant premenstrual disorder[1]. A plausible neurobiological substrate involves altered central sensitivity to neuroactive steroids, particularly allopregnanolone acting at GABA-A receptor sites, which has been proposed to underlie heightened irritability and affective lability during the luteal phase in vulnerable women[18]. Co-occurring somatic symptoms — headache, fatigue, dizziness, and palpitations — were similarly prevalent, in keeping with international survey data describing frequent co-occurrence of somatic and affective complaints and their combined contribution to functional impairment[19]. Reduced parasympathetic tone during the symptomatic luteal phase offers one physiological explanation for concurrent fatigue and sleep disruption in this population[17].

Fluid Retention and Body Composition

Weight gain was the individual symptom with the highest severe-category proportion in this study (41.4%), alongside prominent breast tenderness and fluid retention. This is consistent with earlier obstetric work demonstrating that perceived premenstrual "weight gain" typically reflects cyclical fluid redistribution and abdominal bloating rather than true adipose accumulation[20]. The modest postmenstrual reduction in mean body weight, BMI, and body fat percentage, together with a concurrent rise in body water percentage observed in the present cohort, is compatible with this physiological interpretation, though the categorical shifts in weight, BMI, and body-water status did not reach statistical significance.

Cognitive Performance Across Menstrual Phases

A clear descriptive shift toward impairment in the premenstrual phase and normal performance postmenstrually was observed across all three cognitive instruments, consistent with the broader literature describing menstrual-cycle-linked modulation of attention, working memory, and processing speed[12,22,23]. Hormone-linked modulation of prefrontal cortical circuitry, implicated in executive control and working memory, provides a plausible mechanistic framework for such transient change[21], and neuroimaging evidence of cycle-dependent variation in stress-related neural circuitry lends additional biological plausibility[24]. However, the phase-wise categorical comparison in this study did not reach statistical significance for any of the three tests (Stroop, p=0.240; N-back, p=0.317; DSST, p=0.925). Several methodological considerations are relevant to interpreting this null result rather than treating it as evidence against a cycle-related cognitive effect. First, all three cognitive-test tables in the analysed dataset returned identical category counts, which is not biologically plausible for three functionally distinct instruments and suggests a data-transcription or table-population error requiring verification against original scoring sheets. Second, Fisher's exact test as applied compares the premenstrual and postmenstrual distributions as though they arose from independent samples; because each participant contributed both a premenstrual and a postmenstrual score, a paired categorical test (McNemar–Bowker, as specified in the pre-planned statistical methods) is the analytically appropriate approach and would be expected to have materially greater power to detect within-subject change given the magnitude of the

observed shift (55.2% mild impairment premenstrually versus 3.4% postmenstrually). Re-analysis using the paired test on verified, test-specific data is recommended before these cognitive findings are treated as conclusive.

Depressive and Cognitive Symptom Clustering

Depressive symptoms, forgetfulness, confusion, and insomnia were reported at clinically relevant severity, with confusion and forgetfulness frequently rated severe. This subjective cognitive complaint pattern paralleled the objective performance shift described above, and comparable clustering of subjective and performance-based cognitive change has been demonstrated in earlier neuropsychological work comparing women with and without premenstrual dysphoric disorder across the menstrual cycle[22].

Qualitative Convergence

The qualitative themes identified — emotional dysregulation, interpersonal conflict, cognitive and occupational inefficiency, social withdrawal, sleep disturbance, and physical exhaustion — converged closely with both the quantitative symptom profile and the PMCM coping domains, supporting methodological triangulation across the mixed-methods design. This convergence reinforces the characterisation of PMS as a multidimensional condition with tangible functional consequences rather than an isolated mood disturbance.

Strengths

• Prospective, within-subject design assessing the same participants in both premenstrual and postmenstrual phases, reducing inter-individual variability and recall bias relative to retrospective symptom report.

• Use of objective, performance-based cognitive instruments (Stroop test, verbal N-back test, DSST) rather than subjective cognitive complaint alone.

• Combined quantitative and qualitative methodology, permitting triangulation of findings.

• A rural Indian population, a setting under-represented in the existing premenstrual symptom literature.

• Use of a validated, multidimensional coping instrument (PMCM) rather than an unstructured coping inventory.

LIMITATIONS

• Convenience sampling was used, which carries a risk of selection bias and limits generalisability to the broader population of reproductive-age women.

• This was a single-centre study, further constraining external validity.

• PMS status was established by questionnaire rather than prospective daily symptom charting across multiple cycles, the reference-standard diagnostic approach.

• Hormonal assays were not performed, precluding direct biological correlation of symptom or cognitive change with circulating oestrogen, progesterone, or neurosteroid levels.

• Potential confounders — psychosocial stress, sleep pattern, dietary intake, physical activity, and concurrent life events — were not systematically measured or controlled.

• Repeated cognitive testing carries a risk of practice effects, which may have contributed to the postmenstrual improvement observed independent of any true cycle-related effect.

• Only three cognitive domains were assessed, selected pragmatically rather than through a comprehensive standardised neuropsychological battery.

• The Stroop, verbal N-back, and DSST tables returned identical category counts in the analysed dataset, and the applied Fisher's exact test did not account for the paired, within-subject structure of the data; both issues require resolution — through verification against original scoring records and re-analysis with a paired test such as McNemar–Bowker — before the cognitive findings reported here are treated as definitive.

CONCLUSION

Premenstrual symptoms were universally reported in this rural South Indian cohort and were associated with substantial affective, somatic, and subjective cognitive burden alongside a descriptive shift toward objectively impaired attention, working memory, and processing speed during the premenstrual phase; this shift did not reach statistical significance under the categorical test applied and requires confirmation with paired statistical analysis of verified test-specific data. Participants relied on a broad, multidimensional repertoire of avoidance-based, cognitive, and interpersonal coping strategies largely independent of symptom severity, consistent with culturally embedded self-management within this population. These findings support incorporating routine screening for mood, cognitive, and physical premenstrual symptoms into clinical practice, particularly in rural settings where such symptoms may be normalised and underreported, and indicate a need for adequately powered, multi-centre studies employing prospective daily symptom charting, paired statistical analysis, and hormonal correlation to clarify the mechanisms underlying menstrual-cycle-related cognitive change.

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