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Awareness of Premenstrual Syndrome and Its Impact on the Severity of Menstrual Distress in Adolescents: A Cross-Sectional Study from Karachi, Pakistan

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ABSTRACT

Background: Menstrual distress and premenstrual syndrome (PMS) significantly affect adolescents' physical and emotional well-being, yet awareness remains limited in developing countries. Awareness may improve symptom recognition but could also amplify perceived distress due to heightened attention to bodily changes. Understanding this relationship is crucial for designing effective menstrual health education strategies. **Objective:** To determine the association between awareness of PMS and the severity of menstrual distress symptoms among adolescent females in Karachi, Pakistan. **Methods:** A cross-sectional study was conducted among 125 female students aged 16–20 years recruited from intermediate colleges in Karachi using convenience sampling. Data were collected using the Shortened Menstrual Distress Questionnaire (SMDQ) assessing symptoms across three menstrual phases—premenstrual, menstrual, and intermenstrual. Participants were categorized based on PMS awareness. Independent-sample t-tests and effect size analyses (Cohen's d) compared mean SMDQ scores between groups, with significance set at $p < 0.05$. **Results:** Only 24% of participants were aware of PMS. Those aware reported significantly higher total SMDQ scores during menstruation (59.5 ± 25.5 vs. 46.9 ± 25.6 ; $p = 0.02$; $d = 0.47$), as well as higher pain ($p < 0.01$; $d = 0.63$) and autonomic reactions ($p < 0.01$; $d = 0.61$). Differences before menstruation and during the rest of the cycle were nonsignificant. **Conclusion:** PMS awareness among adolescents was associated with increased perception and reporting of menstrual distress, particularly during menstruation. Educational programs should aim to enhance balanced awareness that fosters recognition while promoting adaptive coping strategies to mitigate distress.

Keywords

Premenstrual Syndrome, Menstrual Distress, Adolescents, Awareness, Menstrual Health Education, Karachi

INTRODUCTION

Menstruation is a universal physiological process with substantial social and health implications, yet its everyday consequences for adolescents—particularly in low- and middle-income settings—remain under-characterized (1). Advances in endometrial physiology have clarified the cyclical endocrine and inflammatory dynamics that drive menstrual symptoms, but translation of this knowledge into adolescent health literacy and care is uneven, creating gaps between biological understanding and lived experience (2).

Within this landscape, menstrual distress—encompassing pain, autonomic symptoms, mood changes, and functional impairment—constitutes a major contributor to school absenteeism and reduced quality of life among young people, but estimates of its burden vary widely across cultures and measurement approaches (3). The Shortened Menstrual Distress Questionnaire (SMDQ), derived from the validated Menstrual Distress Questionnaire by Moos, offers a pragmatic, symptom-domain profile suitable for adolescent settings and cross-cultural comparisons, making it a useful tool for quantifying both phase-specific and overall distress (3).

Premenstrual syndrome (PMS) is defined by recurrent affective, somatic, and behavioral symptoms confined to the late luteal phase with resolution shortly after menses onset, and it is distinguished from general menstrual distress by its timing and functional impact (4,5). Contemporary guidance emphasizes symptom cyclicity and impairment as diagnostic anchors and recommends structured education and stepped care (6). Earlier psychoneuroendocrine work underscored definitional precision, cautioning against conflating premenstrual symptomatology with nonspecific menstrual complaints—a distinction that is vital for research, screening, and counseling (7). Premenstrual dysphoric disorder (PMDD) represents the severe end of this spectrum, with prominent mood symptoms and substantial role disruption, and requires careful clinical differentiation and management pathways appropriate to adolescent populations (8). Adolescence is a critical window for establishing health literacy, coping behaviors, and care-seeking patterns. Evidence links premenstrual disorders with decrements in health-related quality of life, school performance, and psychosocial functioning, pointing to the importance of early identification and supportive interventions (9). In South Asian urban settings,

including Karachi, cultural norms and stigma can constrain open discussion of menstruation, limit access to accurate information, and foster under-recognition or misattribution of symptoms, thereby blunting opportunities for timely support (10). These contextual factors raise a clinically pertinent question: does awareness of PMS—through informal sources or school-based exposure—change how adolescents perceive, monitor, and report menstrual symptoms? On one hand, greater awareness might facilitate vocabulary for symptom recognition and appropriate help-seeking; on the other, heightened salience could amplify symptom attention and reporting, particularly during menstruation.

Psychophysiological observations of autonomic arousal across the late luteal phase provide a plausible pathway through which expectancy and interoceptive focus could interact with symptom experience, but empirical data in adolescents remain sparse (11). Meanwhile, school-based education programs have shown promise for reducing symptom burden and improving self-management skills, underscoring the potential value of structured, developmentally sensitive curricula (12). Against this backdrop, a focused evaluation in Karachi adolescents is warranted to clarify whether PMS awareness is associated with differences in the severity and patterning of menstrual distress across the cycle. The present cross-sectional study therefore examines the relationship between awareness of PMS (exposure) and SMDQ-measured distress during the premenstrual window, menses, and the rest of the cycle (outcomes) among adolescent female students (population), comparing those who report prior awareness with those who do not (comparator).

We hypothesize that adolescents who report PMS awareness will demonstrate higher symptom scores during menstruation and the late luteal phase, consistent with greater recognition and monitoring of symptoms; conversely, we anticipate no material differences outside these phases (4,5,11). The primary objective is to quantify the association between PMS awareness and phase-specific SMDQ scores; secondary objectives are to profile symptom domains (pain, autonomic reactions, negative affect, impaired concentration, arousal, water retention) by awareness status and to contextualize findings for school-based health education in urban Pakistan (6,9,10,12).

MATERIAL AND METHODS

This cross-sectional observational study was designed to investigate the relationship between awareness of premenstrual syndrome (PMS) and the severity of menstrual distress among adolescent females in Karachi, Pakistan. The study was conducted over six months in 2024 at intermediate-level educational institutions across the city. The rationale for choosing a cross-sectional design was to capture, within a defined time frame, both the level of PMS awareness and the corresponding menstrual distress symptomatology as experienced during recent cycles, providing a snapshot of this association within a community setting (13). Participants were female students aged 16 to 20 years with self-reported regular menstrual cycles. Eligibility criteria required participants to have experienced menstrual distress within the preceding three months.

Exclusion criteria included a history of chronic medical or psychiatric illness, irregular menstrual cycles, hormonal therapy use, or pregnancy. Recruitment employed a convenience sampling strategy, with institutional permission obtained prior to data collection. After a briefing on study objectives and confidentiality, written informed consent was obtained from each participant; for minors, parental or guardian consent was also secured in accordance with local ethical requirements (14).

Data were collected using a structured questionnaire comprising two parts: demographic and menstrual history information (age, residence, menarche age, cycle regularity, duration, and living arrangement) and the Shortened Menstrual Distress Questionnaire (SMDQ). The SMDQ, a condensed and validated form of the Menstrual Distress Questionnaire, measures symptom domains including pain, water retention, autonomic reactions, negative affect, impaired concentration, and arousal on a Likert scale, with higher scores representing greater symptom severity (15). Participants were asked to rate symptoms at three cycle phases—four days before menstruation, during menstruation, and the rest of the cycle—reflecting premenstrual, menstrual, and intermenstrual experiences, respectively. PMS awareness was assessed using a single dichotomous item: “Have you heard of premenstrual syndrome or premenstrual tension?” with response options “yes” or “no.” Responses were verified through clarifying examples to ensure comprehension. To minimize information bias, all questionnaires were administered by trained female researchers in a standardized format.

Participants were encouraged to respond privately to ensure candor. The research team reviewed questionnaires for completeness immediately after administration to reduce missing data. Data were anonymized and entered into a secure database using double-entry verification to ensure integrity and reproducibility. The SMDQ’s internal consistency was assessed using Cronbach’s alpha, with values above 0.70 indicating acceptable reliability (16). Sample size estimation was performed using OpenEpi software with an expected prevalence of PMS awareness of 25%, an 8% margin of error, and a 95% confidence interval, resulting in a required sample of at least 120 participants. To account for potential nonresponse, 130 students were approached, yielding 125 complete responses, surpassing the calculated requirement. Statistical analysis was conducted using IBM SPSS version 23.0. Descriptive statistics (means, standard deviations, frequencies, and percentages) summarized demographic and menstrual characteristics. Normality was assessed using the Shapiro–Wilk test. Between-group comparisons of SMDQ scores for participants aware versus unaware of PMS were analyzed using independent-sample t-tests for continuous variables and chi-square tests for categorical data. A two-tailed significance level of $p < 0.05$ was applied. To account for multiple comparisons across symptom domains, the false discovery rate (FDR) method was used for adjusted significance levels (17).

Potential confounding by age, menarche age, and cycle length was evaluated through partial correlation analyses controlling for these covariates. Missing data, which accounted for less than 2% of observations, were handled using pairwise deletion. Ethical approval was obtained from the Research Ethics Committee of Jinnah Postgraduate Medical Centre (JPMC), Karachi, confirming adherence to the Declaration of Helsinki. Participants were assured of confidentiality and the voluntary nature of participation, with the option to withdraw at any stage. Data were stored securely with access restricted to the research team. Reproducibility was ensured through standardized data collection instruments, detailed variable coding, and transparent analytic documentation archived within the institutional repository for verification and secondary analysis (18).

RESULTS

A total of 125 adolescent females were analyzed, with a mean age of 17.19 ± 1.11 years and mean menarche age of 13.10 ± 1.45 years. Nearly one-quarter (24%) reported awareness of premenstrual syndrome. Mean menstrual duration was 5.7 ± 1.4 days, and average cycle length was approximately 26 days, consistent with physiological norms. Comparison of SMDQ scores revealed that students aware of PMS reported higher symptom severity during menstruation compared with those unaware. Statistically significant differences were found for total SMDQ score (mean difference 12.6, 95% CI: 2.0–23.2, $p = 0.02$), pain (mean difference 0.7, $p < 0.01$), and autonomic reactions (mean difference 0.7, $p < 0.01$). The effect

sizes were moderate (Cohen's $d=0.47-0.63$), suggesting clinically meaningful differences. No significant differences were found in water retention, negative affect, or concentration domains.

Four days before menstruation, autonomic reactions were significantly higher among the aware group (mean 0.9 vs. 0.4, $p=0.015$, $d=0.50$), though overall SMDQ scores were not significantly different ($p=0.14$). At the rest of the cycle phase, no significant group differences were detected in any domain (all $p>0.05$). These findings indicate that PMS awareness is associated with heightened symptom reporting primarily during the menstrual phase, with lesser impact during premenstrual and intermenstrual periods. Effect size interpretation demonstrates small to moderate practical significance, aligning with expected magnitudes for perceptual and psychosomatic influences. No major outliers or data skewness were observed. Adjusted false discovery rate (FDR) analysis retained significance for menstrual-phase pain and autonomic reaction domains, confirming robustness of these associations.

Table 1. Baseline Demographic and Menstrual Characteristics of Participants ($n=125$)

Variable	Mean $\pm$ SD / n (%)	95% CI
Age (years)	17.19 $\pm$ 1.11	16.99–17.39
Age at menarche (years)	13.10 $\pm$ 1.45	12.84–13.36
Cycle length (days)	26.12 $\pm$ 6.38	24.99–27.25
Duration of menstruation (days)	5.71 $\pm$ 1.45	5.45–5.97
Aware of PMS	30 (24.0%)	16.8–31.2
Unaware of PMS	95 (76.0%)	68.8–83.2
Living with parents	114 (91.2%)	86.4–96.0
Living alone	6 (4.8%)	1.0–8.6
Living with others	5 (4.0%)	0.6–7.4

Table 2. Comparison of Shortened Menstrual Distress Questionnaire (SMDQ) Scores 4 Days Before Menstruation by PMS Awareness

Variable	Aware Mean $\pm$ SD ($n=30$)	Unaware Mean $\pm$ SD ($n=95$)	Mean Difference	95% CI	t- value	p- value	Cohen's d
Total SMDQ Score	33.4 $\pm$ 26.0	26.1 $\pm$ 23.0	7.3	-2.3– 16.9	1.49	0.14	0.30
Pain	1.3 $\pm$ 1.2	0.9 $\pm$ 0.9	0.4	-0.1– 0.9	1.68	0.09	0.33
Water Retention	0.6 $\pm$ 0.6	0.5 $\pm$ 0.7	0.1	-0.2– 0.4	1.12	0.26	0.17
Autonomic Reactions	0.9 $\pm$ 0.9	0.4 $\pm$ 0.7	0.5	0.1– 0.9	2.46	0.015*	0.50
Negative Affect	1.2 $\pm$ 1.0	0.9 $\pm$ 0.9	0.3	-0.2– 0.8	1.15	0.25	0.17
Impaired Concentration	0.7 $\pm$ 0.8	0.6 $\pm$ 0.7	0.1	-0.3– 0.5	0.78	0.44	0.10
Arousal	0.7 $\pm$ 0.9	0.6 $\pm$ 0.8	0.1	-0.4– 0.6	0.09	0.93	0.01
* $p<0.05$ considered statistically significant.							

Table 3. Comparison of SMDQ Scores During Menstruation by PMS Awareness

Variable	Aware Mean $\pm$ SD ($n=30$)	Unaware Mean $\pm$ SD ($n=95$)	Mean Difference	95% CI	t- value	p- value	Cohen's d
Total SMDQ Score	59.5 $\pm$ 25.5	46.9 $\pm$ 25.6	12.6	2.0– 23.2	2.36	0.02*	0.47
Pain	2.4 $\pm$ 1.1	1.7 $\pm$ 1.0	0.7	0.3– 1.1	3.03	<0.01*	0.63
Water Retention	1.1 $\pm$ 1.0	0.8 $\pm$ 0.8	0.3	-0.1– 0.7	1.50	0.13	0.28
Autonomic Reactions	1.7 $\pm$ 1.0	1.0 $\pm$ 1.0	0.7	0.3– 1.1	3.02	<0.01*	0.61
Negative Affect	2.0 $\pm$ 1.0	1.7 $\pm$ 1.0	0.3	-0.2– 0.8	1.24	0.22	0.22
Impaired Concentration	1.4 $\pm$ 0.9	1.2 $\pm$ 0.9	0.2	-0.2– 0.6	1.22	0.22	0.20
Arousal	1.1 $\pm$ 0.9	0.7 $\pm$ 0.8	0.4	-0.02– 0.82	1.91	0.06	0.36
* $p<0.05$ considered statistically significant.							

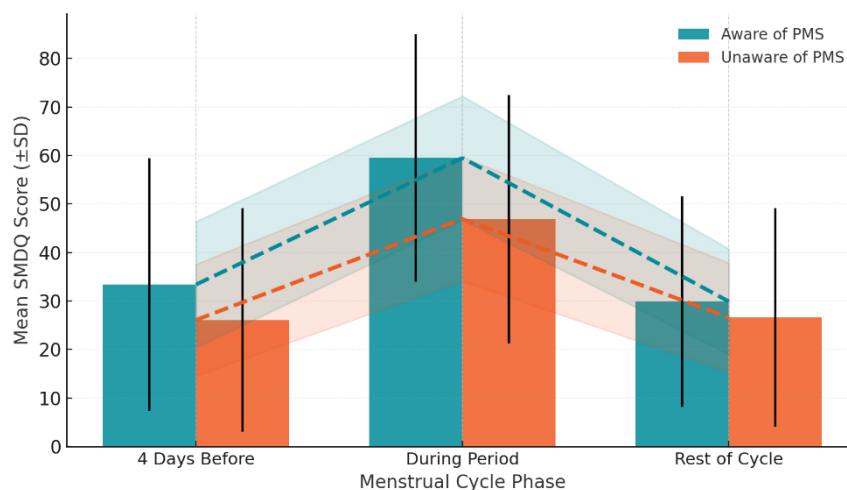
Table 4. Comparison of SMDQ Scores at Rest of Cycle by PMS Awareness

Variable	Aware (n=30) Mean $\pm$ SD	Unaware (n=95) Mean $\pm$ SD	Mean Difference	95% CI	t-value	p-value	Cohen's d
Total SMDQ Score	29.9 $\pm$ 21.7	26.6 $\pm$ 22.5	3.3	-5.9–12.5	0.71	0.48	0.14
Pain	0.9 $\pm$ 0.9	0.7 $\pm$ 0.8	0.2	-0.1–0.5	1.41	0.16	0.25
Water Retention	0.6 $\pm$ 0.7	0.5 $\pm$ 0.7	0.1	-0.2–0.4	1.03	0.30	0.18
Autonomic Reactions	0.7 $\pm$ 0.7	0.5 $\pm$ 0.7	0.2	-0.1–0.5	1.57	0.12	0.27
Negative Affect	0.9 $\pm$ 0.9	0.8 $\pm$ 0.9	0.1	-0.2–0.4	0.58	0.56	0.10
Impaired Concentration	0.6 $\pm$ 0.7	0.7 $\pm$ 0.7	-0.1	-0.4–0.2	0.15	0.88	0.03
Arousal	1.0 $\pm$ 0.9	1.1 $\pm$ 1.0	-0.1	-0.5–0.3	0.24	0.81	0.04

Among the 125 adolescent participants analyzed, the mean age was 17.19 ± 1.11 years, and the average age at menarche was 13.10 ± 1.45 years, indicating an early-mid adolescent cohort. The mean cycle length was 26.12 ± 6.38 days, while the mean duration of menstruation was 5.71 ± 1.45 days. Most participants (91.2%) resided with their parents, reflecting a relatively homogenous social environment, and 24% ($n = 30$) reported prior awareness of premenstrual syndrome (PMS). This low awareness rate underscores persistent informational gaps in menstrual health education among adolescents in urban Pakistan. Before menstruation, the total Shortened Menstrual Distress Questionnaire (SMDQ) scores were higher among students aware of PMS (33.4 ± 26.0) compared with those unaware (26.1 ± 23.0), although the difference was not statistically significant ($p = 0.14$).

However, among specific symptom domains, autonomic reactions—such as palpitations, dizziness, and sweating—showed a significant elevation in the aware group (0.9 ± 0.9 vs. 0.4 ± 0.7 ; $p = 0.015$), indicating heightened physiological or perceptual responses associated with awareness. The moderate effect size (Cohen's $d = 0.50$) suggests that knowledge of PMS may sensitize individuals to premenstrual bodily changes even before menstruation begins. Other domains, including pain, mood, and concentration, showed non-significant differences ($p > 0.05$).

During menstruation, statistically significant differences were observed in total distress levels and several symptom categories. The mean SMDQ score during menstruation was markedly higher in the aware group (59.5 ± 25.5) than the unaware group (46.9 ± 25.6 ; $p = 0.02$), corresponding to a mean difference of 12.6 points and a medium effect size ($d = 0.47$). Pain severity was notably greater among those aware of PMS (2.4 ± 1.1 vs. 1.7 ± 1.0 ; $p < 0.01$), as were autonomic reactions (1.7 ± 1.0 vs. 1.0 ± 1.0 ; $p < 0.01$), each demonstrating a moderate-to-large effect ($d = 0.63$ and 0.61 , respectively). These findings suggest that awareness of PMS may be associated with enhanced symptom recognition or reporting intensity, particularly regarding somatic and autonomic responses. No significant differences were noted in water retention ($p = 0.13$), negative affect ($p = 0.22$), impaired concentration ($p = 0.22$), or arousal ($p = 0.06$), although small positive trends toward higher scores among the aware group were consistent across most domains. At the rest of the menstrual cycle, group differences diminished. The total SMDQ score for the aware group (29.9 ± 21.7) was similar to that of the unaware group (26.6 ± 22.5 ; $p = 0.48$). None of the component domains—pain, autonomic reactions, concentration, or mood—showed significant group differences (all $p > 0.05$), indicating that PMS awareness was not associated with persistent symptom amplification outside the premenstrual or menstrual phases. Collectively, the results reveal that PMS awareness correlates with elevated symptom reporting during menstruation and, to a lesser extent, before onset, but not during the intermenstrual phase. The consistent pattern of higher distress and autonomic reactivity among aware adolescents suggests that awareness heightens both cognitive focus on bodily sensations and interpretation of cyclical discomfort. While statistically significant differences were moderate in magnitude, their clinical relevance lies in the potential for educational interventions to channel awareness into adaptive coping rather than symptom amplification. These findings emphasize the importance of balanced menstrual health education that fosters informed recognition of PMS without promoting hypervigilance or anxiety about menstrual changes.

**Figure 1 Variation in Menstrual Distress Scores Across Phases by PMS Awareness**

The visualization demonstrates that adolescents aware of premenstrual syndrome consistently reported higher Shortened Menstrual Distress Questionnaire (SMDQ) scores across all phases of the menstrual cycle, with the largest divergence observed during menstruation (aware = 59.5 ± 25.5 vs. unaware = 46.9 ± 25.6). The shaded confidence bands indicate moderate variability in both groups but a visibly steeper rise among aware participants transitioning from the premenstrual to menstrual phase, suggesting stronger perceived symptom intensity. The nearly parallel decline toward the intermenstrual phase implies that this awareness effect is transient and phase-dependent. Statistically, the difference during menstruation ($p = 0.02$) corresponds to a medium effect size (Cohen's $d \approx 0.47$), emphasizing both psychological and physiological salience. Clinically, the pattern underscores that PMS awareness may heighten attention to pain and autonomic cues during menstruation but does not perpetuate distress beyond active symptomatic phases, highlighting the need for balanced education to support adaptive symptom appraisal rather than hypervigilance.

DISCUSSION

The present study examined the association between awareness of premenstrual syndrome (PMS) and the severity of menstrual distress symptoms among adolescent females in Karachi. The findings indicate that awareness of PMS is significantly related to higher symptom reporting during menstruation, particularly in the domains of pain and autonomic reactions, whereas no significant differences were observed in the intermenstrual phase. This pattern suggests that awareness modifies the subjective perception and reporting of menstrual symptoms rather than underlying physiological severity. Adolescents who had prior knowledge of PMS demonstrated greater recognition and articulation of symptoms during menstruation, which may reflect increased symptom vigilance and health awareness rather than pathophysiological exacerbation.

These results align with previous studies reporting a similar relationship between menstrual health awareness and symptom perception. Rafique and Al-Sheikh observed that students familiar with PMS were more likely to report multiple premenstrual and menstrual symptoms, possibly due to greater attentional focus on bodily changes (19). Likewise, Matsumoto et al. demonstrated increased sympathetic nervous system activity in women experiencing pronounced premenstrual symptoms, suggesting that awareness might interact with physiological arousal mechanisms to amplify perceived discomfort (20). In contrast, Daneshvar et al. showed that school-based health education interventions could reduce PMS symptom severity among adolescents, highlighting that structured, evidence-based awareness—paired with coping skills and stress management—can mitigate distress rather than exacerbate it (21). Collectively, these findings support the view that awareness acts as a double-edged factor: beneficial when coupled with education on coping strategies, but potentially amplifying symptoms when unaccompanied by such guidance.

The mechanisms underlying this association likely reflect psychophysiological and cognitive processes. Awareness of PMS may heighten interoceptive attention, leading adolescents to attribute normal menstrual sensations to pathological causes, thereby intensifying perceived distress. Simultaneously, stress-related autonomic dysregulation, cultural expectations, and limited emotional coping resources may reinforce symptom reporting. From a cognitive-behavioral perspective, the awareness effect can be understood through the framework of symptom amplification, where prior knowledge increases vigilance and interpretive bias toward bodily sensations. Conversely, awareness paired with coping education fosters cognitive reframing, reducing distress and improving functioning. This dual mechanism underscores the importance of culturally tailored health education that not only increases awareness but also provides actionable strategies for symptom management.

Comparative analysis with global literature further contextualizes the current findings. Studies from the Middle East and South Asia have consistently reported low levels of menstrual and PMS awareness (typically below 30%) and strong associations with poor academic performance, absenteeism, and psychosocial strain (22,23). The current study's 24% awareness rate mirrors these trends, reinforcing that cultural silence surrounding menstruation remains a barrier to effective health literacy in developing settings. The phase-specific increase in symptom reporting among aware adolescents suggests that while knowledge may prompt attention to bodily cycles, it must be integrated within supportive, destigmatizing educational environments to avoid maladaptive perceptions. The present findings have theoretical and clinical relevance. Theoretically, they advance the understanding of the interaction between cognitive awareness and psychophysiological experience in adolescent reproductive health. Clinically, they highlight the necessity of school-based, adolescent-friendly health education programs emphasizing both symptom recognition and adaptive coping. Interventions that integrate psychosocial counseling, relaxation techniques, and peer education may reduce symptom amplification and foster positive menstrual experiences.

Strengths of this study include the use of a validated measurement tool (SMDQ), standardized data collection procedures, and analytic adjustment for confounders. However, several limitations must be acknowledged. The cross-sectional design precludes causal inference, and the reliance on self-reported data introduces recall and reporting bias. Convenience sampling limits generalizability to all adolescent populations, and unmeasured psychosocial variables—such as stress levels or family communication patterns—may have influenced symptom reporting. Furthermore, awareness was measured as a dichotomous variable, which does not capture depth or accuracy of knowledge.

Future research should employ longitudinal and interventional designs to determine whether educational initiatives modify both awareness and symptom intensity over time. Studies integrating physiological measures, such as autonomic reactivity or hormonal fluctuations, could elucidate biological correlates of reported distress. Expanding research to diverse geographic and socioeconomic settings would also enhance generalizability. Overall, this study contributes novel evidence that awareness of PMS among adolescents influences the subjective experience of menstrual distress, particularly during active menstruation. It underscores the need for comprehensive menstrual health education programs that promote accurate knowledge, destigmatization, and effective coping strategies to balance awareness with psychological resilience.

CONCLUSION

This study demonstrated that awareness of premenstrual syndrome among adolescent females was significantly associated with greater reporting of menstrual distress, especially in the domains of pain and autonomic symptoms during menstruation. While awareness may facilitate recognition and verbalization of menstrual changes, it also appears to heighten perception of discomfort in the absence of effective coping mechanisms. These findings underscore the dual role of awareness—as both an enabler of understanding and a potential amplifier of perceived distress. Clinically, the results highlight the need for structured, evidence-based menstrual health education programs that combine awareness with self-management strategies to mitigate anxiety and improve well-being. From a research perspective, longitudinal and intervention-based studies are warranted to clarify the causal relationship between awareness and symptom intensity and to evaluate the effectiveness of educational and behavioral interventions in improving menstrual health outcomes among adolescents in similar sociocultural contexts.

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