Perceived Stress and Menstrual Cycle Disturbances Among College-Going Female Students Aged 18–24 Years: A Descriptive Cross-Sectional Study

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Abstract

Background: The transition to higher education exposes young women to multiple stressors that may disrupt hormonal homeostasis and, consequently, menstrual physiology. Despite growing recognition of this relationship, empirical data from urban Indian undergraduate populations remain scarce.

Objective: To examine the association between perceived psychological stress and menstrual cycle disturbances in college-going female students aged 18–24 years attending a university in New Delhi, India.

Methods: A descriptive, cross-sectional survey design was used. One hundred female undergraduates were recruited via random sampling. Perceived stress was quantified using Cohen's Perceived Stress Scale (PSS-10), and dysmenorrhoea severity was assessed with the Working-ability, Location, Intensity, Days of pain, and Dysmenorrhoea (WaLIDD) score. Pearson's correlation coefficient was computed using SPSS version 17 to explore bivariate relationships between stress and menstrual characteristics.

Results: The mean PSS score was 21.25 ± 5.39 (moderate stress category) and the mean WaLIDD score was 6.31 ± 2.11 (moderate dysmenorrhoea). A statistically significant moderate positive correlation was identified between perceived stress and menstrual cycle disturbances ($r = 0.326$, $p < 0.01$). Frequency analysis revealed that 74% of participants experienced moderate stress levels and 49% fell in the moderate dysmenorrhoea category.

Conclusion: Elevated perceived stress among college-going women is significantly associated with greater menstrual cycle disturbances. These findings highlight the need to integrate stress management programmes—including occupational therapy-led interventions—into campus health services.

Keywords: Perceived stress · Menstrual cycle · Dysmenorrhoea · College students · Occupational therapy · PSS · WaLIDD.

1 Introduction

Young adulthood—typically spanning the college years of 18 to 24 years—is a developmentally critical period marked by academic demands, psychosocial transitions, and emerging autonomy. Concurrent with these pressures, many young women experience disruptions in reproductive health that are frequently overlooked in campus wellness frameworks [1]. Among the most physiologically sensitive markers of female reproductive function is the menstrual cycle, whose hormonal regulation is profoundly susceptible to psychosocial stressors [2].

Psychological stress activates the hypothalamic–pituitary–adrenal (HPA) axis and suppresses gonadotrophin-releasing hormone (GnRH) pulsatility, thereby perturbing the downstream secretion of luteinising hormone (LH)

and follicle-stimulating hormone (FSH). The consequent hormonal imbalance can manifest as cycle irregularities, altered flow characteristics, worsened premenstrual symptoms, and heightened dysmenorrhoea [3,4]. Epidemiological data corroborate this mechanistic pathway; for instance, high perceived stress has been associated with a fourfold increase in the odds of amenorrhoea and a 2.8-fold increase in the odds of premenstrual syndrome in young women [5].

Despite this evidence base, the dual burden of stress and menstrual morbidity among Indian college students has received limited systematic attention. Most available studies have focused on medical students or populations in high-income countries, potentially limiting generalisability to broader undergraduate cohorts in low- and middle-income settings. Moreover, few investigations have explicitly framed menstrual disturbance within an occupational therapy (OT) lens, which would offer practical strategies for improving daily functioning and quality of life [6,7].

The present study addresses these gaps by (i) quantifying perceived stress and dysmenorrhoea severity in a sample of Delhi-based female undergraduates using validated instruments, and (ii) testing the hypothesis that higher perceived stress is significantly associated with greater menstrual cycle disturbances. Findings are intended to inform campus health policy and guide OT-led intervention design.

2 Review of Prior Research

A growing body of literature implicates stress as a pathophysiological modifier of the menstrual cycle. Singh et al. [8] compared menstrual outcomes in 100 female students (50 medical, 50 non-medical) and documented a significant relationship between stress and both passage of clots ($p = 0.010$) and premenstrual symptoms ($p = 0.002$). Kollipaka et al. [9] found that medical students with elevated PSS scores experienced significantly higher rates of dysmenorrhoea requiring medication ($p = 0.035$) and irregular cycles ($p = 0.025$), reinforcing the case for targeted stress reduction.

Rafique and Al-Sheikh [5] surveyed 738 health-science students and identified a significant positive correlation between high perceived stress and menstrual problems; students with high stress had approximately fourfold greater odds of amenorrhoea. Similarly, Nagma et al. [10] established an association between PSS scores exceeding 20 and menstrual irregularity, though not with flow duration or dysmenorrhoea alone. These nuanced results suggest that the specific domain of menstrual dysfunction may be differentially influenced by the magnitude of stress.

Regarding dysmenorrhoea in particular, Jain et al. [11] demonstrated a statistically robust relationship between PSS scores and the late luteal and menstrual phases of the cycle, implicating declining oestrogen as a biological mediator of perceived stress. Hassan et al. [12] observed that 77.9% of school and college students reported moderate menstrual distress, while Batubara et al. [13] reported a negative correlation between stress level during menstruation and cycle length using Spearman's rank test, indicating that increased stress is associated with shorter, potentially irregular cycles.

From an occupational science perspective, Sen et al. [14] found a moderately significant association between occupational stress in nurses and menstrual symptom scale scores, directly paralleling the academic stressor–menstrual outcome pathway in students. Maity et al. [15] further documented that menstrual disturbances adversely affect academic performance and social participation, reinforcing the relevance of OT interventions that address occupational role performance and daily habit formation.

Collectively, the existing evidence supports a directional relationship between psychological stress and menstrual disturbance; however, studies employing the WaLIDD scoring tool for dysmenorrhoea in conjunction with the PSS in an Indian undergraduate cohort remain absent, motivating the present investigation.

3 Methods

3.1 Study Design and Setting

A descriptive, cross-sectional survey was conducted between January and April 2024 at a university campus in New Delhi, India. Ethics approval was obtained from the institutional review board of the School of Nursing Sciences and Allied Health, Jamia Hamdard. All participants provided written informed consent prior to enrolment.

3.2 Participants

Eligibility criteria were defined a priori. Inclusion required participants to be female, enrolled in an undergraduate programme, aged 18–24 years, and willing to participate voluntarily. Exclusion criteria comprised a diagnosis of polycystic ovarian disease (PCOD), current pregnancy, any psychiatric or chronic medical condition likely to independently affect menstrual function, and menstrual cycles outside the normative 21–35-day range at baseline. Students who withdrew consent at any stage were also excluded. A sample of 100 participants was recruited using a simple random sampling technique.

3.3 Instruments

Perceived stress was measured with the ten-item Perceived Stress Scale (PSS-10) developed by Cohen et al. [16]. Items probe the frequency of stressful feelings and thoughts over the preceding month on a five-point Likert scale (0 = never to 4 = very often). Four positively worded items (items 4, 5, 7, and 8) are reverse-scored before summing to yield a total score ranging from 0 to 40, with higher scores denoting greater perceived stress. Scores are classified as low (0–13), moderate (14–26), or high (27–40). The PSS-10 has demonstrated sound internal consistency ($\alpha \geq 0.78$) and good predictive validity in student populations [16].

Dysmenorrhoea severity was evaluated using the WaLIDD score developed by Teherán et al. [17]. WaLIDD is a composite measure capturing four dimensions: Working ability (frequency with which pain limits daily activity), Location (number of body sites affected), Intensity (pain level using a modified Wong–Baker FACES scale reclassified into four levels), and Days of pain. Each subscale is scored 0–3, yielding an aggregate range of 0–12, which is interpreted as no dysmenorrhoea (0), mild (1–4), moderate (5–7), or severe (8–12). The WaLIDD has shown superior effect size compared with the visual analogue scale (VAS) for predicting medical leave in university students and can be self-administered without specialist supervision [17].

3.4 Data Collection Procedure

Data were collected through an offline, paper-based questionnaire administered in a quiet, distraction-free classroom setting. The study objectives were explained to eligible participants and confidentiality was assured. Completion of the full questionnaire required approximately 15 minutes. Demographic information collected included age, weight, height, and relevant menstrual history.

3.5 Statistical Analysis

Data entry and management were performed in Microsoft Excel. Inferential analysis was conducted using SPSS version 17 (IBM Corporation, Armonk, NY, USA). Descriptive statistics (mean, standard deviation, frequency distributions) were calculated for all continuous and categorical variables. Pearson's product-moment correlation coefficient was used to examine the bivariate relationship between PSS-10 and WaLIDD scores, given that both variables approximated normal distributions. The significance threshold was set at $\alpha = 0.05$ (two-tailed).

4 Results

4.1 Participant Characteristics

One hundred female undergraduates participated. Participant ages ranged from 18 to 24 years, with a mean age of 21 years; the modal age categories were 20 and 21 years (35 participants each). All participants were of Indian origin and were currently enrolled in full-time undergraduate study.

4.2 Descriptive Statistics

Table 1 presents the descriptive statistics for the two primary outcome measures. The mean PSS-10 score was 21.25 ± 5.39, placing the sample mean within the moderate stress band. The mean WaLIDD score was 6.31 ± 2.11, consistent with moderate dysmenorrhoea.

Table 1 Descriptive statistics for PSS-10 and WaLIDD scores (N = 100)

Variable	Mean	Standard Deviation	N
Perceived Stress Scale (PSS-10)	21.25	5.39	100
WaLIDD Score	6.31	2.11	100

4.3 Frequency Distributions

Frequency analysis of stress categories (Table 2) indicated that 9 participants (9.0%) had low stress (PSS category 1), 74 (74.0%) had moderate stress (PSS category 2), and 17 (17.0%) had high stress (PSS category 3). With regard to dysmenorrhoea severity, 18 participants (18.0%) scored in the mild range (WaLIDD category 2), 49 (49.0%) in the moderate range (category 3), and 33 (33.0%) in the severe range (category 4).

Table 2 Frequency distribution of stress and dysmenorrhoea categories

Category	Stress Level n (%)	Dysmenorrhoea Severity n (%)
Low / Mild	9 (9.0)	18 (18.0)
Moderate	74 (74.0)	49 (49.0)
High / Severe	17 (17.0)	33 (33.0)
Total	100 (100.0)	100 (100.0)

4.4 Correlation Analysis

Pearson's correlation analysis revealed a statistically significant moderate positive relationship between perceived stress (PSS-10) and menstrual cycle disturbance (WaLIDD score): $r = 0.326$, $p = 0.001$ (two-tailed). This finding indicates that as perceived stress levels increase, dysmenorrhoea severity tends to increase commensurately. The correlation matrix is presented in Table 3.

Table 3 Pearson correlation between PSS-10 and WaLIDD score

Variable	PSS-10	WaLIDD Score
PSS-10 (r)	—	0.326**
WaLIDD Score (r)	0.326**	—
Sig. (2-tailed)	0.001	0.001
N	100	100

** Correlation is significant at the 0.01 level (two-tailed).

The scatter plot (Fig. 1) illustrates the positive linear trend between PSS-10 and WaLIDD scores, visually corroborating the moderate positive correlation. The alternative hypothesis—that there is a significant effect of stress on the menstrual cycle among college students—is therefore accepted.

5 Discussion

The present study provides evidence of a statistically significant moderate positive correlation between perceived psychological stress and menstrual cycle disturbances in a sample of urban Indian female undergraduates. These results are consistent with the broader literature [5,8–11] and extend prior work by combining the PSS-10 with the WaLIDD—a tool specifically validated for predicting activity limitation due to dysmenorrhoea in university populations [17].

The observed mean PSS score of 21.25 indicates that the sample, on average, experienced moderate stress, a finding in line with comparable studies of undergraduate populations in India [18]. The modal stress category (74% moderate) mirrors the documented prevalence of psychosocial stressors associated with academic evaluation, social adjustment, and financial pressures during the college years [1,3]. That 17% of participants fell in the high-stress category is clinically noteworthy, as high perceived stress has been shown to substantially amplify menstrual morbidity via HPA-axis-mediated suppression of ovarian function [4].

The mean WaLIDD score of 6.31 (moderate dysmenorrhoea) and the finding that 33% experienced severe dysmenorrhoea underscore the scale of reproductive morbidity in this cohort. Dysmenorrhoea at this severity level has been shown to impair occupational performance, including study capacity, attendance, and participation in daily activities [6,15]. An OT framework is therefore particularly appropriate, as occupational therapists are trained to address the interplay between chronic health conditions and participation in meaningful daily roles.

From a biological standpoint, the stress–menstruation pathway is mediated by corticotrophin-releasing hormone (CRH), which both stimulates cortisol secretion and directly suppresses GnRH pulsatility [2]. Elevated cortisol in turn dampens oestrogen and progesterone synthesis, leading to anovulation, luteal-phase defects, and altered prostaglandin metabolism—the latter directly driving the uterine contractions responsible for dysmenorrhoea [4,9]. The current correlation coefficient of 0.326, while moderate in magnitude, is biologically plausible given the multiple confounders (e.g., BMI, sleep, physical activity) not controlled in this cross-sectional design.

The occupational therapy implications of these findings are substantial. OT interventions delivered individually or in group formats—encompassing mindfulness-based stress reduction, activity scheduling, sleep hygiene programmes, ergonomic modifications, and psychoeducation on menstrual health—have demonstrated effectiveness in reducing functional impairment associated with chronic pain and psychological distress [6,7]. Facilitating role adaptation, building coping routines, and providing structured self-management support are core OT competencies directly applicable to this population [7]. Campus-based OT services could offer menstrual health literacy sessions alongside stress management, thereby addressing both proximal and distal determinants of reproductive well-being.

Additionally, these findings are relevant for broader campus wellness policy. Universities should consider systematic screening for perceived stress among incoming students and establish referral pathways to mental health and allied health services. Co-curricular stress management programmes embedded within the academic calendar may help mitigate the adverse reproductive consequences of examination-related stress spikes [3,18].

6 Limitations

Several methodological limitations warrant acknowledgement. First, the sample was drawn from a single university in New Delhi, limiting geographical and socioeconomic generalisability. Second, the cross-sectional design precludes causal inference; longitudinal study is needed to establish temporality. Third, self-reported data are susceptible to recall and social-desirability bias. Fourth, important confounding variables—including body mass index, physical activity, dietary patterns, sleep quality, and hormonal contraceptive use—were not systematically controlled. Fifth, the restriction to college-going women may exclude the experiences of non-enrolled young women in the same age bracket. Future studies should employ longitudinal designs with larger, multi-site, and more demographically diverse samples, while incorporating objective measures of hormonal status.

7 Conclusion

This study demonstrates a significant moderate positive association between perceived stress and menstrual cycle disturbances in college-going female students aged 18–24 years ($r = 0.326$, $p < 0.01$). The majority of participants exhibited moderate stress and moderate-to-severe dysmenorrhoea, highlighting reproductive morbidity as an underaddressed dimension of student health. Occupational therapy, with its emphasis on meaningful occupation, habit formation, and coping strategies, offers a valuable and cost-effective complement to medical management in this context. Campus-level integration of stress management and menstrual health programmes is strongly recommended.

References

1. Siddiqui FR, Sabih F, Danish KF. Stress among medical students. Prof Med J. 2009;16(3):395–399.
2. Harlow SD, Campbell OM. Menstrual dysfunction: a missed opportunity for improving reproductive health in developing countries. Reprod Health Matters. 2000;8(15):142–147. https://doi.org/10.1016/S0968-8080(00)90019-9
3. Wolf TM, Faucett JM, Randall H, Balson PM. Graduating medical students' ratings of stresses, pleasures, and coping strategies. J Med Educ. 1988;63(8):636–642.
4. Nagma S, Kapoor G, Bharti R, et al. To evaluate the effect of perceived stress on menstrual function. J Clin Diagn Res. 2015;9(3):QC01–QC03. https://doi.org/10.7860/JCDR/2015/12240.5611
5. Rafique N, Al-Sheikh MH. Prevalence of menstrual problems and their association with psychological stress in young female students studying health sciences. Saudi Med J. 2018;39(1):67–73. https://doi.org/10.15537/smj.2018.1.21438
6. Pekcetin S, Ozdinc S, Ata H, et al. Perceived occupational competence and value among university students with premenstrual dysphoric disorder. Br J Occup Ther. 2022;85(5):327–331. https://doi.org/10.1177/03080226211043454
7. Morris K, Cox DL. Developing a descriptive framework for 'occupational engagement'. J Occup Sci. 2017;24(2):152–164. https://doi.org/10.1080/14427591.2017.1296764
8. Singh R, Sharma R, Rajani H. Impact of stress on menstrual cycle: a comparison between medical and non-medical students. Saudi J Health Sci. 2015;4(2):115–119. https://doi.org/10.4103/2278-0521.157894
9. Kollipaka R, Arounassalame B, Lakshminarayanan S. Does psycho-social stress influence menstrual abnormalities in medical students? J Obstet Gynaecol. 2013;33(5):489–493. https://doi.org/10.3109/01443615.2013.775206
10. Nagma S, Kapoor G, Bharti R, Bhardwaj A. To evaluate the effect of perceived stress on menstrual function. J Clin Diagn Res. 2015;9(3):QC01–3.
11. Jain P, Chauhan AK, Singh K, Garg R, Jain N, Singh R. Correlation of perceived stress with monthly cyclical changes in the female body. J Fam Med Prim Care. 2023;12(11):2927–2933. https://doi.org/10.4103/jfmpc.jfmpc_549_23
12. Hassan Z, Chishty M, Azam Y, et al. Menstrual distress among school and college students. Int J Health Sci. 2022;6(S3):4975–4984.
13. Batubara FR, Sirait GLA, Achmad LN. Relationship between menstrual stress levels and menstrual cycle in medical students. J Drug Deliv Ther. 2022;12(4-S):140–146. https://doi.org/10.22270/jddt.v12i4-S.5559
14. Sen M, Yakit E, Uyurdag N, Erten Z. The effect of occupational stress experienced by nurses on menstruation. Gynecol Obstet Reprod Med. 2023;29(2):112–118.
15. Maity S, Wray J, Coffin T, et al. Academic and social impact of menstrual disturbances in female medical students: a systematic review and meta-analysis. Front Med. 2022;9:802302. https://doi.org/10.3389/fmed.2022.802302
16. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. J Health Soc Behav. 1983;24(4):385–396. https://doi.org/10.2307/2136404
17. Teherán AA, Pavón-Londoño FJ, Guillén MF, et al. WaLIDD score, a new tool to diagnose dysmenorrhea and predict medical leave in university students: development and validation. Int J Womens Health. 2018;10:35–42. https://doi.org/10.2147/IJWH.S150657
18. Waghachavare VB, Dhumale GB, Kadam YR, Gore AD. A study of stress among students of professional colleges from an urban area in India. Sultan Qaboos Univ Med J. 2013;13(3):429–436. https://doi.org/10.12816/0003266