ORIGINAL ARTICLE

Exploring the Relationship Between Perceived Stress and Menstrual Health in Undergraduates Across Different Academic Disciplines

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ABSTRACT

Background: Menstrual disorders are associated with high stress in females. The current study was carried out to assess the extent of perceived stress and its impact on the menstrual health among female students enrolled in various undergraduate courses, both medical and non-medical. **Methods:** A cross-sectional study was conducted, with the objective to find out the association of stress with menstruation health problems. Around 300 participants were selected, from MBBS, Nursing, and Paramedical/Engineering/Management**.** Two scales PSS-14 and GHQ-12 were used to detect emotional disturbances and level of stress. **Results:** The mean Perceived Stress Scale (PSS) score was 26.24 ± 6.411, with a minimum score of 11 and a maximum score of 47 among the study subjects. Maximum perceived stress was observed among nursing students, followed by students in other courses. The prevalence of Menstruation Disorders was recorded at 69.3% with the highest proportions observed among nurses**.** Among participants experiencing menstrual health problems, 31 (14.9%) reported no stress, while 177(85.1%) reported high stress levels. The results indicate a significant association between menstrual health problems and stress levels ($\chi^2 = 4.405$, $p = 0.04$). **Conclusion:** Early evaluation of stress among students will help reduce psychiatric morbidity and can also improve their academic performances.

KEYWORDS

Perceived stress; Menstrual Health Problems; GHQ -12; PSS 14; Undergraduates

INTRODUCTION

Menstruation, though a natural physiological process, can impact psychological well-being. Conversely, if psychological well-being is compromised, it may adversely affect menstrual health.(1) Mental health issues such as anxiety and depression can affect menstrual cycle.(2) Previous research has indicated a link between lifestyle factors and menstrual health.(3) Stress affects the HPG and HPA axes, leading to alterations in the menstrual cycle. This theory is well-established and has been demonstrated by numerous researchers.(4) Students are more prone to stress due to their demanding academic schedule. Dysmenorrhea or painful menses is significantly associated with depression.(5) Women often neglect menstrual symptoms as these are not immediately life-threatening. These symptoms pose a widespread concern, as their severity can disrupt academics, attendance, and overall performance.(6,7) Elevated stress can be associated with painful menstruation.(8) Stress can

increase contractions of the uterine muscles and worsening of menstrual symptoms.(9,10) Research examining the role of stress on menstrual health across various educational programs, particularly in this region of India, is limited. Therefore, this study is conducted to assess the extent of perceived stress and its impact on the menstrual cycle among students enrolled in various undergraduate courses, both medical and non-medical.

MATERIAL & METHODS

Study type and Study design:

A cross-sectional study was conducted, with the objective to find out the association of perceived stress with menstrual health problems, for two months. Written informed consent was taken from all respondents and Ethics committee approval was received before initiating the study. This study is a part of STS-ICMR Project.

Study Setting: Study was conducted across different undergraduate students including Medical, Nursing, Paramedical, Engineering and Management colleges.

Sample size: Female students from undergraduate programs were taken as the sample population. According to an analytical study average prevalence of menstrual health problems and stress score was taken as 32.7%.(11) Given this, the estimated sample size was ~100 study subjects, using Formula N= 4pq/l2 (where p is prevalence=32.7%, allowable error "l" =10%, q=100-p=67.3, and 10% non-response rate)

This sample size was equally distributed among various undergraduate courses i.e., 100 students from all years of each course on PPS basis and simple random sampling.

Inclusion criteria: Female Undergraduate students from various educational courses in the university namely:

Medical college, College of Nursing, and, Paramedical students, Engineering College and Management college students, were included in this study. Individuals willing to sign consent. Participants with no mental and gynaecological health problem.

Exclusion criteria:

1) Students not accessible during survey

2) Study tool with more than 20% missing information were omitted from the study.

Collection of samples: Hundred undergraduate students from each program were included for the study purpose. The purpose of the study was explained to the participants and informed consent was obtained. The study respondents were then provided with a questionnaire to collect socio-demographic information and questions about menstrual health, perceived stress scales and other study parameters. Standardized scales were used wherever applicable. Their anonymity was maintained throughout the study.

Study tools: To measure mental health status of the respondents like detection of emotional disturbances and level of stress, two scales were used:

1) Perceived Stress Scale-14 (PSS-14)

The Perceived Stress Scale (PSS-14) is the most widely used psychological instrument for measuring the perception of stress. It measures show much a situation in anyone's life are perceived as stressful. In every case, participant is asked to answer 14 questions and indicate by circling how often she felt or thought a certain way ranging from 0 means never to 4 referring very often. The7 positive Items (4, 5, 6, 7, 9, 10, & 13) were scored in reverse direction (items 4, 5, 7, & 8) i.e., 0 = 4, 1 = 3, 2 = 2, 3 = 1 & 4 = 0 and then adding all the scale items. Cut off for low or high stress among respondents was taken at PSS score 20. The subjects who scored ≤20 on the PSS were categorized to have low stress levels, while subjects with score >20 were categorized to have high stress. This cut off values were taken with reference from previous literature.(12,13)

2) **The General Health Questionnaire (GHQ-12**)- Each item of the GHQ-12 was evaluated using a 4-point scale, with response options including "less than usual/not at all," "no more than usual," "rather more than usual," and "much more than usual." A bimodal scoring method (ranging from 0 to 1) was primarily employed, for positive items, where agreement indicated good health, responses were scored as 0-0-1-1, with the two least symptomatic answers assigned a score of 0 and the two most symptomatic answers assigned a score of 1. For negative items, where agreement indicated poor health or illness, responses were scored as 0-1-1-1, with the least symptomatic answer scored as 0 and the three most symptomatic answers scored as 1. Hence the minimum score was 0 and maximum score was 12. Threshold for GHQ 12 was taken at "4" means score of more than equal to 4 was taken as disturbed mental health or distressed respondent.(14,15)

Menstrual History (16,17): The questionnaire gathered information on menstrual history, age at menarche, cycle length and regularity, flow duration and volume, type and intensity of menstrual pain, and the use of analgesics. Participants rated their pain severity on a scale from 0 to 10 (0–3 indicating no or mild pain, 4–7 moderate pain, and 8–10 severe pain). Symptoms related to premenstrual syndrome (PMS) were also listed, enabling participants to identify those applicable to their experience. A normal menstrual

cycle was defined as having an interval of 21 to 35 days and a duration of 2 to 7 days.

Menstrual cycle patterns were categorized as follows:

Regular cycles: Cycle length of 21–35 days.

Irregular cycles: Cycle length of less than 21 days or more than 35 days.

Amenorrhea: The absence of menstruation.

Secondary amenorrhea: Missing three or more consecutive cycles in the past year.

An abnormal menstrual pattern was identified based on the following conditions:

Dysmenorrhea: Painful cramps during menstruation.

Oligomenorrhea: Menstrual bleeding occurring more than 35 days apart, characterized by infrequent, light, or delayed flow.

Hypomenorrhea: A PBAC score below 10 or menstrual bleeding lasting less than 2 days.

Metrorrhagia: Irregular, acyclic bleeding.

Menorrhagia: Excessive or prolonged menstrual bleeding (lasting more than 7 days) at normal intervals.

Passage of clots: The occurrence of blood clots during menstruation.

Statistical Analysis: Collected data was entered into MS Excel sheet and analysis was done using SPSS version 20. All qualitative and quantitative variables were expressed as frequencies and percentages and mean and standard deviation. The chi-square test was employed to examine categorical data. A p-value of less than 0.05 was interpreted as statistically significant.

RESULTS

The present study aimed to determine the prevalence of perceived stress among students in different undergraduate courses and examine its association with menstrual health problems. A sample of 300 participants was selected for this study, and it was evenly distributed across three courses: MBBS, Nursing, and Paramedical/Engineering/Management.

Table-1 Mean of general characteristics, menstrual health variables and stress scales of respondents

Variables	Mean ±SD
Age (years)	20.57 ±1.402
Weight (kgs)	54.26 ±9.454
Height (cms)	162.21±6.53
BMI (kg/m^2)	20.595 ± 3.17
GHQ score	6.70 ± 3.081
PSS score	26.24 ± 6.411
Age of first ever menstruation (years)	13.57 ±1.314
Duration of menstrual cycle (no. of days)	4.67 ±1.143
No of pad used per day	3.3 ±1.105

Table 1 illustrates a comprehensive overview of the central tendency and variability observed within the measured variables, shedding light on the age, physical measurements, psychological well-being, and menstrual health characteristics of the study participants. It provides a description of the mean values of various variables in the current study. The participants' ages varied between 17 and 24 years, with an average age of 20.57 ± 1.402 years. The mean weight was 54.26 ± 9.454 kg, with a minimum weight of 31 kg and a maximum weight of 90 kg. The highest reported body mass index (BMI) during the study among respondents was 31.9 kg/m². In terms of psychological well-being, the mean General Health Questionnaire (GHQ) score was 6.70 ± 3.081, with scores ranging from 0 to 12 among the students. The mean Perceived Stress Scale (PSS) score was 26.24 ± 6.411, with a minimum score of 11 and a maximum score of 47 among the study subjects. Regarding menstrual characteristics, the duration of the menstrual cycle as reported by respondents ranged from 2 to 10 days. Furthermore, the earliest observed age for the first-ever menstruation in the present study was 10 years, while the maximum age reported was 17 years.

Table -2 Distribution of students of various undergraduate courses according to menstrual health problems

Menstrual health problems	MBBS (100)	Nursing (100)	Paramedical /engineering /management (100)	Total (300)
PMS	68 (33.6)	66 (32.6)	68 (33.7)	202 (67.3)
Menstrual disorder*	56(26.9)	90 (43.3)	62 (29.8)	208 (69.3)
Cycle length in days				
<20	8 (40)	9 (45)	3 (15)	20 (6.7)
21-35	85 (32.7)	86 (33.1)	89 (34.2)	260 (86.7)
>35	7 (35)	5 (25)	8 (40)	20 (6.7)
Missed activities	51 (31.5)	54 (33.3)	57 (35.2)	162 (54)

Absenteeism/missing college days	21(32.3)	12 (18.5)	32 (49.2)	65 (21.7)
Pain				
0-3(mild)	37 (36.6)	32 (31.7)	32 (31.7)	101 (33.7)
4-7(moderate)	51 (32.5)	49 (31.2)	57 (36.3)	157 (52.3)
8-10(severe)	11 (31.4)	16 (45.7)	8 (22.9)	35 (11.7)
Use of Drugs for menstrual disorders				
Use of drugs for pain relieving	67 (32.7)	68 (33.2)	70 (34.1)	205 (68.3)
Self-medication	43 (35.8)	35 (29.2)	42 (35.0)	120 (58.5)
Treatment given by parents	9 (23.1)	18 (46.2)	12 (30.8)	39 (19.02)
Treatment given by doctor	15 (32.6)	15 (32.6)	16 (34.8)	46 (22.4)

*Percentages are in parenthesis; *Pre-menstrual Syndrome (PMS)*

Table 2 summarizes the distribution of menstrual health problems across various undergraduate courses students. The prevalence of Pre-Menstrual Syndrome (PMS) was found to be 67.3%, with similar rates observed across all courses. Furthermore, the prevalence of Menstrual disorders was recorded at 69.3%, with the highest proportions observed among nursing students, followed by students in other courses. Most of the respondents reported having a normal cycle length. In terms of the impact of menstrual disorders on daily activities, approximately half of the students stated that they missed routine activities such as walking, going to the gym, visiting temples, or going to the market due to menstrual disorders. Additionally, 21.7% of the respondents reported missing classes as a result of menstrual disorders. Among these individuals, the majority were from paramedical, engineering, and management courses, while the fewest were from the nursing course. Regarding the severity of pain experienced, 64% of the students reported moderate to severe pain. Among this group, 68.3% were taking medication to alleviate their symptoms.

Table-3 Prevalence of perceived stress among various undergraduate programs according to PSS and GHQ (N=300)

Program	High stress (PSS>20) n=246 (82%)	Distressed (GHQ≥4) n=242 (80.6%)
MBBS	84 (34.1%)	82 (33.9%)
Nursing	77 (31.3%)	84 (34.7%)
Paramedical/Engineering/ Management	85 (34.6%)	76 (31.4%)
X^2; p- value	2.575; 0.23	2.22; 0.32

Table 3 provides data on the distribution of students across different courses, based on their levels of perceived stress & distress. Overall, when considering all the courses combined, 246 students (82.0%) reported high stress levels, and 242 students (80.6%) reported experiencing distress. Among the participants having high stress level and distresses, 34.1% MBBS students reported high levels of stress, with 33.9% students experiencing distress, nursing students, 31.3% reported high stress levels, while 34.7% students reported distress. Similarly, in the Paramedical/Engineering/Management program, 34.6% reported high stress levels, and 31.4% reported distress. Chi-square test statistics suggest no significant association between the courses and the prevalence of high stress and distress.

Table-4 Association of menstrual health problems with perceived stress and GHQ

Menstrual health problems	PSS		X^2; p-value
	Not stressed	High stress	
Present	31 (14.9)	177 (85.1)	4.405; 0.04
*PMS	34 (16.8)	168(83.2)	0.572;0.45
Menstrual health problems	**GHQ**		
	Not Distressed	**Distressed**	
Present	30 (14.4)	178 (85.6)	10.486; 0.001
*PMS	38(18.8)	164(81.2)	0.108; 0.74

**Pre-menstrual Syndrome (PMS)*

Table 4 presents information on the prevalence of menstrual health problems, premenstrual syndrome (PMS), and its correlation with stress levels (measured using the Perceived Stress Scale, or PSS-14) and psychological distress (measured using the General Health Questionnaire, or GHQ). Among participants experiencing menstrual health problems, 31 (14.9%) reported no stress, while 177(85.1%) reported high stress levels. The results indicate a significant association between menstrual health problems and stress levels (χ^2 = 4.405, p = 0.04). For those with PMS, 34 (16.8%) reported no stress, and 168 (83.2%) reported high stress levels; however, this association was not statistically significant (χ^2 = 0.572, p = 0.45).

In terms of psychological distress, among participants with menstrual health problems, 30 (14.4%) reported no distress, while 178 (85.6%) reported experiencing distress. Nevertheless, there was no significant association observed between PMS and distress (χ^2 = 0.108, p = 0.74). Based on these findings, we can conclude that there is a significant association between menstrual health problems and both high stress levels and distress. However, no significant associations were observed between PMS and either stress levels or distress.

DISCUSSION

In the present study, our aim was to determine the level of stress among female students in various educational courses and establish the association between stress and menstrual disorders. The mean age of the respondents in this study was 20.57 ± 1.402 years. The mean weight was 54.26 ± 9.454 kgs, and the height was 162.21 ± 6.53cms. The highest BMI reported among the respondents during this study was 31.9 kg/m2, while the mean BMI was 20.595 ± 3.17 kg/m2. Our findings are consistent with another study conducted by Singh R et al.(11)

The mean GHQ (General Health Questionnaire) score was 6.70 ± 3.081, with a minimum score of 0 and a maximum score of 12 among the students. The mean PSS (Perceived Stress Scale) score was 26.24 ± 6.411, with a minimum score of 11 and a maximum score of 47 among the study subjects. In a study conducted in Pune on medical students, the mean PSS score for female students (n=83) was 24.78 (SD 7.61), which was lower than our study.(18) The reason for this difference might be that the Pune study included only first-year students, and stress tends to increase with each year of study.

While a significant association was found between overall menstrual health problems and perceived stress (p = 0.04), no such association was observed for PMS specifically (p = 0.45), suggesting that other menstrual concerns may play a more prominent role in influencing psychological stress.

Maximum perceived stress was observed among MBBS students compared to nursing and Paramedical/Engineering/Management courses. The mean stress score was higher in a study conducted on medical and non-medical students compared to our study.(11) Various studies conducted globally have also revealed that medical students experience a higher level of stress compared to students in other professional courses. (19-21)

The duration of the menstrual cycle reported by the respondents ranged from 2 to 10 days. The mean age of menarche was 13.57 ± 1.314 years. The youngest age of first menstruation observed in the present study was 10 years, while the oldest age was 17 years. Similar findings were reported by Omidvar, S et al in a study conducted in South India (21). Conversely, a slightly higher mean age was observed in a study by Nisreen Aref. (22) In another study, the mean age and age at menarche were 22.30 years and 14.0 years, respectively, which were higher than our findings.(23,24)

The prevalence of Pre-Menstrual Syndrome (PMS) was 67.3%, and it was almost equal across all courses. The prevalence of menstrual disorders was 69.3%, with the highest prevalence observed among nursing students, followed by students in other courses. The majority of respondents had a normal cycle length. Approximately half of the students reported missing routine activities such as walking, going to the gym, visiting the temple, or going to the market due to menstrual disorders. 21.7% of the respondents reported missing classes due to menstrual disorders, with the majority being from paramedical/ engineering/ management courses and the fewest from nursing. Moderate (52.3%) to severe pain (11.2%) was reported by 64% of students, and out of this group, 68.3% were taking medication. The most common menstrual disorder observed was dysmenorrhea. Similarly, another study reported that 30% of the students suffered from irregular menstrual cycles, 77% experienced dysmenorrhea, and 68% suffered from PMS. Absenteeism due to menstrual disorders and PMS was also reported in the same study. Around 80% of the study subjects reported moderate to severe painful menses, which was higher. (23) Ekpenyong CE in his survey stated that 34.6% of the participants were suffering from menstrual disorder and it was much lesser than our findings. (25) Nwankwo et al, showed prevalence of menstrual disorders in 69.4% of participants with

dysmenorrhea, pre-menstrual syndromes and short menstrual cycle being the most common, (26) as observed in this study. Similarly, numerous studies from various regions have identified menstrual disorders as a significant factor contributing to absenteeism. (27) Similarly in another study 14.8% said that they had severe pain during menstruation and it was slightly more than in our study. (28) Variations in pain severity may be influenced by cultural differences in pain perception and individual differences in pain tolerance. Use of medication for relief of pain was reported by many studies in the range of 55-60 %, which is in contrast to our findings. (29)

Positive association of menstrual disorders with perceived stress was significantly proven in the present study. While with pre-menstrual syndrome no significant association of stress was found. Maximum perceived stress was observed in MBBS students as compared to students of other courses. Studies have reported a strong and significant correlation between academic stress and menstrual disorders in their study. (24,25) These results are consistent with previous research by Andersch et al. (26), Al-Dabal B.K. et al. (27), and Mei et al. (28), which highlight the association between stress and menstrual disorders. Several other studies have also reported the impact of stress on menstrual function. (29,30,31,32)

Conclusion

Studies from past decade highlights a significant association between perceived stress and menstrual health problems among students. With the rapid progress and advancements, serious diseases caused by mental stress, anxiety and depression have impacted the quality of life, leading to infertility, and other related issues. Women are more susceptible to stress due to hormonal changes. Hormones can fluctuate during puberty, menstruation, pregnancy and menopause, causing stress. This study was a small step towards analysing the issues young female students face in their daily life. Stress is multi-factorial with complex causes, its early evaluation among students in distress will help reduce psychiatric morbidity and health issues related to stress, and can also help to improve their academic performances. Intervention such as yoga and other breathing techniques which has shown promising results in reducing menstrual discomfort and overall quality of life. Recent research has focused on designing studies to establish causality and assessment of psychosocial and behavioural intervention within the educational institutions.

Recommendation

Gradually with advancing time stress is becoming common and public health menace which needs to be curbed at every level of health care system. At institutional level, student counselling services should be implemented, organizing stress management workshops along with menstrual education program is the need of hour in order to tackle both psychological stress and menstrual health concerns among female students.

Limitation of the Study

Causation could not be established due to the use of a self-reported questionnaire. In some cases, recall bias may have occurred.

Relevance of the Study

This study will not only help the policy makers and public health experts in understanding the vicious cycle of menstruation and stress but it will also help in crafting better interventions strategies at the various educational institution.

Authors Contribution

Conceptualization, methodology/ design, investigations –SD; Acquiring Data and data curation- TA & JR; Writing original draft- SD, JR & JR; Data analysis and interpretation- DSC, SD; Reviewing and editing- JR.; Revising the manuscript critically for important intellectual content- KG, SD, DSC.

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Conflict of Interest

None.

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Declaration of Generative AI and AI Assisted Technologies in the Writing Process

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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