



To Study The Factors Associated With Premenstrual Syndrome In Young Adults Aged 15-23 Years Old – A Cross-Sectional Study

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Abstract: Premenstrual Syndrome (PMS) is the most common condition affecting young aged women, characterized by physical, emotional, and behavioral symptoms. This study investigates the factors associated with PMS among young adults aged 15-23 years, focusing on sleep patterns, physical activity, stress levels, and symptom severity. A cross-sectional study was conducted among 100 young females in Mumbai using a purposive convenience sampling method. Participants completed validated questionnaires assessing sleep (Athens Insomnia Scale), physical activity (Rapid Assessment of Physical Activity), stress (Perceived Stress Scale), and PMS severity (Premenstrual Symptoms Screening Tool). Anthropometric measurements were also recorded. Data analysis was performed using social science statistics software, employing descriptive statistics and chi-square tests to examine associations. The study found significant associations between PMS severity and various factors. Strength and Flexibility exercises showed strong correlation with PMS ($p=0.043$). Perceived stress strongly correlated with PMS ($p = 0.027$), indicating that higher stress levels increase PMS severity. Sleep disturbances were significantly linked to PMS ($p=0.001$) with moderate and severe insomnia strongly associated with severe PMS. Flexibility and strength exercises were significantly associated with PMS ($p=0.043$). This study highlights the strong association between PMS and modifiable lifestyle factors such as sleep and stress.

Keywords: Premenstrual Syndrome, physical activity, stress, sleep, young adults

I. INTRODUCTION

According to Thiagarajan DK et al., 2022, the reproductive system of a female, unlike men, shows regular cyclic changes that teleologically may be regarded as periodic preparation for pregnancy and fertilization. In humans, the cycle is a menstrual cycle, and its most conspicuous feature is the periodic vaginal bleeding that occurs with the shedding of uterine mucosa (menstruation). The length of the cycle is variable, but an average figure is 28 days from the start of one menstrual period to the start of the next. By common usage, the days of the cycle are identified by number starting with the first day of menstruation. It begins at puberty, ranging from the ages of 10 to 16, and ends at menopause at an average age of 51.

Premenstrual syndrome (PM) encompasses a range of physical, emotional, and behavioral symptoms that occur cyclically in women of reproductive age, typically in the days leading up to menstruation. These symptoms can vary widely in severity and can significantly impact a woman's quality of life and daily functioning. The symptoms of PMS can be broadly categorized into affective, somatic, and behavioral. Affective symptoms include mood swings, irritability, tension, depressed mood, tearfulness, and anxiety.

Somatic symptoms involve physical discomfort such as bloating, breast tenderness, insomnia, fatigue, muscle, joint, back, and abdominal pain. Behavioral symptoms may include changes in appetite, food cravings, and alterations in sleep patterns [Verma et al., 2020]. Several lifestyle factors have been identified as potentially influencing the risk and severity of Premenstrual Syndrome (PMS). Stress management techniques like mindfulness, yoga, and adequate rest can help reduce hormonal imbalances and improve PMS symptoms (Mohebbi et al., 2017). Regular exercise releases endorphins and regulates hormones, thus alleviating PMS symptoms (Filisiana et al., 2024). Prioritizing sleep hygiene through a regular schedule and comfortable environment can improve sleep quality and help manage PMS symptoms like fatigue and mood swings (Önay et al., 2021). Nicolau et al. (2018) conducted a study to evaluate the sleep parameters of women with premenstrual syndrome (PMS) compared to normal controls using data from the EPISONO study in São Paulo, Brazil. The findings revealed that women with PMS experienced poorer sleep quality, greater unrefreshing sleep, and increased subthreshold insomnia. Polysomnography data showed increased total sleep time but reduced peripheral oxygen penetration in PMS participants. Andiarna et al. (2018) investigated the correlation between stress levels and the prevalence of premenstrual syndrome (PMS) among college students using a cross-sectional, analytical observational approach, revealing a significant correlation between stress levels and PMS. The findings suggest that stress is a contributing factor to PMS, highlighting the importance of stress management and prevention in reducing its impact. Sabaei et al. (2015) investigated the relationship between premenstrual syndrome (PMS) and physical activity in female students. The study found a strong inverse correlation between PMS and both physical activity and aerobic power, indicating that regular physical activity, especially aerobic exercise, may help reduce PMS symptoms.

The aim of the study was to study the factors associated with premenstrual syndrome in young adults aged 15-23 years old.

II. Materials and Methodology

A descriptive cross-sectional study was conducted among 100 young female participants aged 15-23 years in Mumbai, specifically in Matunga and Chembur, using a purposive convenience sampling method. Participants were selected based on predefined inclusion criteria, which included individuals from a middle-class economic background with hormonal issues, while critically ill individuals and pregnant women were excluded. Ethical approval by the Seva Mandal Educational Society was obtained before data collection, and participants provided written informed consent, ensuring voluntary participation and confidentiality. Data were collected through a structured questionnaire that took approximately 10 minutes to complete. The questionnaire included self-designed tools for demographic information and validated tools such as the Athens Insomnia Scale for sleep assessment, the Rapid Assessment of Physical Activity (RAPA) for physical activity, the Premenstrual Symptoms Screening Tool (PSST) for PMS severity, and the Perceived Stress Scale (PSS) for stress levels. The collected data were analyzed using Social Science Statistics software, with descriptive statistics such as mean, standard deviation, frequency distribution, and range values computed. The chi-square test was performed to examine associations between variables and PMS severity, with statistical significance set at $p < 0.05$. Results were expressed as mean $\pm$ standard deviation (SD) with 95% confidence intervals (CI).

III. Results and Discussion

The table no. 1 presents the socio-demographic and anthropometric characteristics of 100 participants, including age, occupation, marital status, height, weight, waist and hip measurements, body mass index, and waist-to-hip ratio. It provides the mean, standard deviation, and frequency percentages for each category.

TABLE NO. 1 Socio Demographic and Anthropometric details of the participants

CHARACTERISTICS N= 100	CATEGORY	STD DEVIATION	MEAN	FREQUENCY %
AGE (years)	-	2.22	20.56	100
OCCUPATION	WORKING	-	-	16
	STUDENT	-	-	84
MARITAL STATUS	UNMARRIED	-	-	98
	MARRIED	-	-	2
Anthropometric measurements	HEIGHT (cm)	0.06	160	-
	WEIGHT (kg)	8.67	54.91	-
	WAIST (cm)	6.42	81.02	-
	HIP (cm)	6.72	100.6	-
Body mass index	UNDERWEIGHT	0.99	17.31	21
	NORMAL	1.67	21.30	66
	OVERWEIGHT	1.37	27.13	10
	OBESE	2.95	32.54	3
Waist to Hip Ratio	NORMAL	0.05	0.77	77
	RISK	1.38	0.88	23

Table No. 1 presents the sociodemographic and anthropometric characteristics of 100 participants. The average age is 20.56 years (SD = 2.22), indicating a relatively homogenous age group. Most participants are students (84%) and unmarried (98%), with only a small percentage working (16%) or married (2%). The mean height is 160 cm, while the average weight is 54.91 kg (SD = 8.67). Waist and hip circumferences are 81.02 cm and 100.6 cm, respectively. In terms of BMI, 66% of participants fall within the normal weight range, while 21% are underweight, 10% are overweight, and 3% are obese. Waist-to-hip ratio analysis reveals that 77% have a normal WHR, whereas 23% fall into the risk category, indicating potential metabolic health concerns. These findings highlight a predominantly young, student population with a generally normal BMI, though a small percentage exhibit overweight, obesity, or high WHR, which may require further health interventions.

Table No. 2 presents the prevalence of premenstrual symptoms in a population. The table categorizes symptoms as psychological or physical and further divides them into severity levels: None, Mild, Moderate, and Severe. Frequencies and percentages are provided for each symptom and severity level.

TABLE NO 2 . Prevalence of premenstrual symptoms using premenstrual symptom severity tool of the participants

Symptom	None	Mild	Moderate	Severe
	N (%)			
Psychological symptoms				
Anger/Irritability	9	19	40	32
Anxiety/Tension	12	27	38	23
Tearful/Increased sensitivity to rejection	2	35	48	15
Decreased mood/Hopelessness	0	32	49	19
Decreased interest in work activities	5	30	45	20
Decreased interest in home activities	10	19	42	29
Decreased interest in social activities	8	33	38	21
Difficulty concentrating	12	32	43	13
Feeling overwhelmed or out of control	8	26	58	8
Physical symptoms				
Fatigue/Lack of energy	7	37	39	17
Overeating/Food cravings	8	21	29	42
Insomnia	22	38	30	10
Hypersomnia (needing more sleep)	11	23	22	44
Physical symptoms	1	42	40	17

Table No. 2 presents the prevalence of premenstrual symptoms using the Premenstrual Symptoms Screening Tool (PSST). The table categorizes symptoms into Psychological and Physical domains and further divides them into four severity levels: None, Mild, Moderate, and Severe. A significant portion of participants reported experiencing moderate to severe levels of various premenstrual symptoms. For example, 40% reported moderate anger/irritability, 38% experienced moderate anxiety/tension, and 48% reported moderate tearfulness or increased sensitivity to rejection. Similarly, 49% experienced moderate decreased mood/hopelessness, and 45% reported moderate decreased interest in work activities. In terms of physical symptoms, 39% reported moderate fatigue/lack of energy, and a notable 42% experienced severe overeating/food cravings. While 30% reported moderate insomnia, 44% experienced severe hypersomnia (needing more sleep). The table highlights that a substantial proportion of participants experience moderate to severe levels of various premenstrual symptoms, both psychological and physical.

The table no. 3 presents data on the association between physical activity levels and the severity of premenstrual syndrome (PMS). It categorizes participants into different groups based on their physical activity habits and their PMS severity. The data is presented as frequencies and percentages within each category.

TABLE NO. 3 Association between Physical Activity and Premenstrual Syndrome of the participants

	PMS				P value
Physical Activity	No/Mild PMS	Moderate PMS	Severe PMS	Total(n=100)	
Aerobic					0.551
Sedentary	1(4.0)	8(32.0)	16(64.0)	25	
Under-active	1(10.0)	4(40.0)	5(50.0)	10	
Under-active regular-light	0(0.0)	7(36.8)	12(63.2)	19	
Under-active regular	3(15.8)	6(31.6)	10(52.6)	19	
Active	2(7.4)	5(18.5)	20(74.1)	27	
Strength & Flexibility					0.043*
Strength	0(0.0)	1(20.0)	4(80.0)	5	
Flexibility	4(11.8)	8(23.5)	22(64.7)	34	
Both	1(4.8)	2(9.5)	18(85.7)	21	
None	2(5.0)	19(47.5)	19(47.5)	40	

Note: *P value being less than the typical significance level of 0.05, indicates statistically significant results, allowing rejection of the null hypothesis.

The table no. 3 examines the association between different types of physical activity and the severity of premenstrual syndrome (PMS) in a sample of 100 women. The results indicate a potential link between certain types of physical activity and PMS severity. Specifically, women who engaged in both strength and flexibility exercises had the highest percentage (85.7%) reporting severe PMS, while none reported no/mild PMS. This association was found to be statistically significant (p-value = 0.043), suggesting it is unlikely to be due to chance. In contrast, for aerobic activity, the difference in PMS severity between groups was not statistically significant (p-value = 0.551), implying that the observed differences could be attributed to random chance.

Table 4 shows the association between perceived stress and PMS severity among 100 participants. It displays the distribution of participants across low, moderate, and high perceived stress levels, as well as no/mild, moderate, and severe PMS categories. Counts, percentages, and a p-value are provided.

TABLE NO. 4 Association between Stress and PMS among participants

	PMS				P value
Perceived Stress	No/Mild PMS	Moderate PMS	Severe PMS	Total(n=100)	
Low	3(21.4)	7(50.0)	4(28.6)	14	0.027*
Moderate	4(6.0)	18(26.8)	45(67.2)	67	
High	0(0.0)	5(26.3)	14(73.7)	19	

Note: *P value being less than the typical significance level of 0.05, indicates statistically significant results, allowing rejection of the null hypothesis.

Table 4 demonstrates a statistically significant (p=0.027) association between perceived stress and PMS severity. Participants with low perceived stress were more likely to have moderate PMS (50%), though some experienced no/mild (21.4%) or severe (28.6%) symptoms. Those with moderate stress predominantly reported moderate (26.8%) or severe (67.2%) PMS. Strikingly, in the high stress group, no one reported no/mild PMS, with the majority (73.7%) experiencing severe PMS. This pattern strongly indicates a positive correlation between perceived stress levels and the severity of premenstrual symptoms.

Table 5 examines the association between sleep problems, specifically insomnia severity, and the prevalence of Premenstrual Syndrome (PMS) in 100 participants. It presents the distribution of participants across varying levels of insomnia (none, mild, moderate, and severe) and PMS severity (no/mild, moderate, and severe), including counts, percentages, and a p-value.

TABLE NO. 5 Association between Sleep Problem and Premenstrual Syndrome

	PMS				P value
Insomnia	No/Mild PMS	Moderate PMS	Severe PMS	Total(n=100)	0.001*
None	3(18.8)	7(43.7)	6(37.5)	16	
Mild	3(8.2)	17(45.9)	17(45.9)	37	
Moderate	0(0.0)	6(13.9)	37(86.1)	43	
Severe	1(25.0)	0(0.0)	3(75.0)	4	

Note: *P value being less than the typical significance level of 0.05, indicates statistically significant results, allowing rejection of the null hypothesis.

Table 5 reveals a statistically significant association between insomnia severity and PMS. The data indicates a strong connection as insomnia worsens, so does the likelihood of experiencing more severe PMS. Participants with no insomnia predominantly reported no/mild PMS (18.8%) or moderate PMS (43.7%), with some severe PMS (37.5%). Those with mild insomnia showed a similar pattern, though with a higher proportion experiencing moderate (45.9%) or severe (45.9%) PMS. Individuals with moderate insomnia primarily reported severe PMS (86.1%), with a smaller fraction having moderate PMS (13.9%), and none with no/mild PMS. In the severely insomniac group, the majority (75%) experienced severe PMS, with some reporting no/mild PMS (25%) and none with moderate PMS.

Discussion

Socio Demographic Details of the Participants.

Socio-demographic factors were explored to understand their potential influence on Premenstrual Syndrome (PMS). In the present study of 100 young women, age distribution was relatively homogeneous, focusing on young adults, while occupation and marital status showed non-significant associations with PMS severity. However, findings from larger cross-sectional studies offer contrasting insights; Adriana et al., (2023) observed age-related variations in symptom intensity, with peak levels around age 35, while Poonam et al., (2019) reported a significant association between occupation and PMS severity, but not education level. Conversely, Smitha et al., (2021) demonstrated a significant association between marital status and PMS, with unmarried women experiencing higher rates of severe PMS and working married women experiencing higher rates of severe PMS than married house wives, a finding that contrasts with the non-significant results obtained in the current study and the unnamed study referenced. These discrepancies highlight the complex interplay of socio-demographic variables and PMS, warranting further investigation with larger, more diverse samples

Body Composition indices of the participants

This study investigated the association between body composition, measured by Body Mass Index (BMI) and Waist-to-Hip Ratio (WHR), and Premenstrual Syndrome (PMS) severity. The results indicated no statistically significant relationship between either BMI ($p=0.473$) or WHR ($p=0.241$) and PMS severity, despite variations in participant body composition. This aligns with previous research: Aarti et al. (2019), in their cross-sectional study of young women, also reported a non-significant correlation between BMI and PMS ($p=0.3679$), highlighting that BMI alone may not be a strong predictor of PMS. Similarly, Payam et al. (2023), focusing on women with abdominal obesity, found no significant differences in WHR across varying PMS severity levels ($p=0.205$), suggesting that abdominal fat distribution, as measured by WHR, does not independently contribute to PMS severity. Therefore, our findings, in conjunction with those of Aarti et al.

and Payam et al., suggest that neither BMI nor Waist to Hip Ratio are primary independent determinants of PMS severity.

Physical Activity among study participants

In the present study aerobic exercise did not show a significant association with PMS severity ($p = 0.551$), suggesting that any observed differences between groups may be due to random variation rather than a true effect. These findings imply that the type of physical activity may play a role in PMS severity, with strength and flexibility exercises potentially being linked to greater symptom burden. However, further research is needed to explore the underlying mechanisms and whether other factors, such as exercise intensity, duration, or individual differences, contribute to these associations.

A cross-sectional study was conducted by Silva et al., 2016 to study the prevalence and factors associated with Premenstrual Syndrome in women aged 15-49 years old in Brazil. The result shows that physical activity is not significantly associated with PMS prevalence. For PMS measured by scores, the prevalence was slightly lower in physically active women (22.0%) compared to those who were inactive (25.1%, $p = 0.36$). Similarly, for self-reported PMS, active women had a prevalence of 57.8%, compared to 59.7% in inactive women ($p = 0.6$). Both p-values indicate that these differences are not statistically significant.

The findings of the present study suggest a potential relationship between different types of physical activity and the severity of premenstrual syndrome (PMS). Notably, women who engaged in both strength and flexibility exercises had the highest proportion (85.7%) reporting severe PMS, with none experiencing mild or no symptoms. This association was statistically significant ($p = 0.043$). It is important to note that the higher population did not participate in strength and flexibility exercises. Therefore, the data may show fluctuations due to this lack of participation.

However, a quasi-experimental study results did not line the present study, conducted by Elif et al., 2021, aimed to identify the impact of pilates exercise on premenstrual syndrome in Istanbul University in 50-sample divided into experimental and control groups. The study found that students in the experimental group (exercise group) had significantly lower PMS total scores ($p < 0.001$) compared to the control group (no exercise). Initially, both groups were similar in terms of factors affecting PMS ($p > 0.05$), and there was no significant difference in PMS scores between them. However, by the end of the study, the PMS scores of the control group remained unchanged, while the experimental group showed a significant reduction in PMS scores ($p < 0.001$). This highlights the effectiveness of exercise in reducing PMS symptoms.

Premenstrual Syndrome Symptoms of the Participants

The findings from the present study highlight the significant prevalence of premenstrual symptoms among participants, with a substantial proportion experiencing moderate to severe symptom intensity. Psychological symptoms appear to be particularly prominent, with anger/irritability, anxiety/tension, and tearfulness or increased sensitivity to rejection reported at moderate levels by 40%, 38%, and 48% of participants, respectively. Additionally, nearly half of the participants (49%) reported moderate levels of decreased mood/hopelessness, while 45% experienced a moderate decrease in interest in work activities. These findings suggest that emotional disturbances during the premenstrual phase could impact daily functioning, productivity, and overall well-being.

Physical symptoms were also widely reported, with fatigue/lack of energy affecting 39% of participants at a moderate level. Notably, 42% of participants experienced severe overeating/food cravings, indicating that appetite changes and food-seeking behavior may be pronounced during this phase. Sleep disturbances were another common concern, with 30% reporting moderate insomnia, while a striking 44% experienced severe hypersomnia, suggesting a considerable variation in sleep patterns among individuals.

These results underscore the broad impact of premenstrual symptoms on both psychological and physical health. The high prevalence of moderate to severe symptoms highlights the need for increased awareness, early screening, and appropriate management strategies to support individuals experiencing distressing

premenstrual changes. Addressing these symptoms through lifestyle modifications, dietary interventions, and stress management techniques may help mitigate their impact on daily life.

A cross-sectional study conducted by Manisha et al., 2023 among 420 girls aged from 18-25 years old. The aim was to evaluate the prevalence of Premenstrual Syndrome. The results show that most frequently reported premenstrual symptoms included fatigue (55.2%), general body pain (71.9%), and irritability (76.9%). Additionally, a significant proportion of participants experienced mood-related symptoms such as mood swings (75.9%), loss of interest (64%), anxiety (65.7%), and anger (73%), with 55.2% specifically reporting uncontrollable anger. Cognitive difficulties, including poor concentration and difficulty making decisions, were also noted, along with a short temper (61.9%). Physical symptoms were prevalent as well, with back pain (77.8%), abdominal cramps (68.3%), headache (53.8%), and food cravings (55.9%) being commonly reported. These findings show that the symptoms identified in this study align to varying degrees with those reported in other studies.

Insomnia problem among study participants

The findings from present study highlight a statistically significant association between insomnia severity and premenstrual syndrome (PMS). As insomnia severity increases, the likelihood of experiencing more severe PMS also rises, suggesting a strong correlation between sleep disturbances and menstrual health.

Participants without insomnia primarily reported no/mild PMS (18.8%) or moderate PMS (43.7%), with a smaller proportion experiencing severe PMS (37.5%). Similarly, those with mild insomnia followed a comparable trend, though with a higher prevalence of moderate (45.9%) and severe PMS (45.9%). However, a notable shift was observed among individuals with moderate insomnia, where the majority (86.1%) experienced severe PMS, and only 13.9% reported moderate PMS, with no cases of no/mild PMS.

The most pronounced impact was seen in participants with severe insomnia, where 75% reported severe PMS. Interestingly, a small proportion (25%) still experienced no/mild PMS, while none in this group reported moderate PMS. These findings reinforce the potential role of sleep quality in menstrual health, emphasizing the need for further research into interventions targeting insomnia as a means to alleviate PMS severity.

Ahmed et al., 2020 conducted a cross-sectional study to explore the relationship between sleep disturbances and menstrual symptoms in young women from Upper Egypt. The study included 4,122 participants aged 12 to 25 years, residing in Beni-Suef City, selected through a multi-stage random sampling method. Findings indicated that young women who slept less than 8 hours and less than 7 hours per day experienced a higher likelihood of premenstrual spasms compared to those who slept 8 or more hours per day (OR 1.3, 95% CI 1.1–1.5 and OR 1.3, 95% CI 1.1–1.6, respectively).

Stress level among study participants

The findings from present study reveal a statistically significant association between perceived stress levels and PMS severity ($p = 0.027$). As stress levels increase, so does the severity of PMS, highlighting a strong positive correlation between the two factors.

Participants with low perceived stress were more likely to experience moderate PMS (50%), though a smaller proportion reported no/mild symptoms (21.4%) or severe PMS (28.6%). In contrast, those with moderate stress primarily experienced either moderate (26.8%) or severe PMS (67.2%), indicating a shift toward more intense symptoms. Notably, in the high-stress group, none of the participants reported no/mild PMS, with the vast majority (73.7%) suffering from severe symptoms.

This pattern suggests that higher stress levels may contribute to increased PMS severity, reinforcing the need for stress management strategies as a potential approach to alleviating premenstrual symptoms. Further research is necessary to explore underlying mechanisms and effective interventions for stress-related PMS.

Rathi et al., 2019 conducted a cross-sectional study on final-year female medical students preparing for exams. Participants were assessed using various tools, including the ACOG guidelines, DSM-5 criteria, Perceived Stress Scale (PSS), and Premenstrual Symptom Screening Tool (PSST). The results showed that 66% had PMS based on ACOG guidelines, while 6% met the DSM-5 criteria for PMDD. According to the PSST, 88%

experienced premenstrual symptoms, with 58% having mild/no PMS and 30% reporting moderate to severe PMS. Additionally, 5% met the PMDD criteria on the PSST. Stress levels were mild in 26% and moderate in 74% of participants. A significant association was found between painful menstruation (dysmenorrhea) and PMS, with 93.75% of those experiencing dysmenorrhea also having PMS. Stress also played a role, as 73.1% of those with mild stress had PMS, while 93.2% of those with moderate stress had PMS, showing a statistically significant correlation.

Conclusion

The present study highlights the significant association between premenstrual syndrome (PMS) severity and various lifestyle factors among young adult females aged 15–23 years. The findings reveal that high perceived stress and sleep disturbances are strongly correlated with increased PMS severity, emphasizing the need for stress management and improved sleep hygiene as potential interventions. Additionally, while physical activity did not show a significant association with PMS, engaging in both strength and flexibility exercises was linked to higher PMS severity, warranting further investigation into the role of exercise intensity and type.

The prevalence of moderate to severe PMS symptoms, including psychological disturbances such as irritability, anxiety, and mood swings, as well as physical symptoms like fatigue and food cravings, underscores the impact of PMS on daily life. These results reinforce the importance of early screening and holistic management approaches, incorporating lifestyle modifications such as stress reduction techniques, better sleep practices, and potential dietary interventions to alleviate symptoms.

Reference

1. Andiarna, F. (2018). The Correlation Between Stress Level and Premenstrual Syndrome Among College Students. *Journal of Health Science and Prevention*, 2(1), 8–13.
2. Arafa, A., Mahmoud, O., Abu Salem, E., & Mohamed, A. (2020). Association of sleep duration and insomnia with menstrual symptoms among young women in Upper Egypt. *Middle East Current Psychiatry*, 27,¹ Article 2.
3. Arati, M., & Mesquita, J. C. (2019). Association of premenstrual syndrome with body mass index and its effect on the quality of life: A cross-sectional study. *Journal of South Asian Federation of Obstetrics and Gynaecology*, 11(6), 371–374.
4. BHARTI, P., MITTAL, A., GUPTA, A., GUPTA, P., & JAIN, N. (2019). Premenstrual Syndrome and Associated Factors among Health Care Professionals: A Cross-sectional Study. *Journal of Clinical & Diagnostic Research*, 13(12).
5. Çitil, E. T., & Kaya, N. (2021). Effect of pilates exercises on premenstrual syndrome symptoms: a quasi-experimental study. *Complementary therapies in medicine*, 57,² 102623.
6. Filisiana, A. W., & Supriyadi, S. (2024). The Correlation between Lifestyle and Stress with Premenstruation Syndrome in Nursing Students at Universitas Muhammadiyah Purwokerto. *Proceedings Series on Health & Medical Sciences*, 5, 53-57.

7. Mohebbi, M., Akbari, S. A. A., Mahmodi, Z., & Nasiri, M. (2017). Comparison between the lifestyles of university students with and without premenstrual syndromes. *Electronic physician*, 9(6), 4489–4496.³
8. Nicolau, Z. F., Bezerra, A. G., Polesel, D. N., Andersen, M. L., Bittencourt, L., Tufik, S., & Hachul, H. (2018). Premenstrual syndrome and sleep disturbances: results from the Sao Paulo epidemiologic sleep study. *Psychiatry research*, 264, 427-431.
9. Önay, Ö., & Aydın, C. (2021). Premenstrual syndrome as a sleep disturbing factor: a cross-sectional study. *Acta Medica*, 52(2), 145-151.
10. Pedro, A. O., Brandão, J.D. , P. de Oliveira Silva, S. B., Lapa, M. G., Castilho, V. C. (2024). *Impact of age on premenstrual syndrome prevalence and severity: A population-based survey in Brazil. International Journal of Gynecology & Obstetrics*, 168(3), 1221–1228.
11. Rathi, A. K., Agrawal, M., & Baniya, G. C. (2019). A study of impact of stress: Examinations on menstrual cycle among medical students. *International Journal of Research in Medical Sciences*,⁴ 7(12), 4703.
12. Rezende, A.P. , R., Alvarenga, F. R., Ramos, M., Franken, D. L. Dias da Costa, J. S. Pattussi, M. P. Paniz, V. M. V. (2022). Prevalence of Premenstrual Syndrome and Associated Factors Among Academics of a University in Midwest Brazil.⁵ Prevalência de síndrome pré-menstrual e fatores associados entre acadêmicas de uma Universidade no Centro-Oeste do Brasil. *Revista brasileira de ginecologia e obstetrícia 6 : Revista da Federação Brasileira das Sociedades de Ginecologia e Obstetrícia*,⁷ 44(2), 133–141.
13. Sabaei, Y., Sabaei, S., Khorshidi, D., Ebrahimpour, S., & Fallah-Rostami, F. (2015). The association between premenstrual syndrome and physical activity and aerobic power in female high school students. *Crescent Journal of Medical and Biological Sciences*, 2(2),⁸ 53–58.
14. Sharifan, P., Jafarzadeh Esfehiani, A., Zamiri, A., Ekhteraei Toussi, M. S., Najar Sedgh Doust, F., Taghizadeh, N., Mohammadi-Bajgiran, M., Ghazizadeh, H., Khorram Rouz, F., Ferns, G., & Ghayour-Mobarhan, M. (2023). Factors associated with the severity of premenstrual symptoms in women with central obesity: a cross-sectional study. *Journal of health, population, and nutrition*, 42(1), 9.
15. Smitha, M. (2021). A comparative study of premenstrual syndrome among married and unmarried women. *Journal of Pharmaceutical Research International*, 33(40A), 199-205.
16. Thiyagarajan, D. K., Basit, H., & Jeanmonod, R. (2024). Physiology, Menstrual Cycle. In StatPearls. StatPearls Publishing.
17. Upadhyay, M., Mahishale, A., & Kari, A. (2023). Prevalence of premenstrual syndrome in college-going girls: A cross-sectional study. *Clinical Epidemiology and Global Health*,⁹ 20(1), 101234.

18. Verma, R. K., & Chaturvedi, S. (2020). Prevalence of Premenstrual Syndrome among Female Medical Students of a Tertiary Care Hospital. *International Journal of Medical Science and Education*, 7(1), 44-50.

