

## Original Research Article

# A study of impact of stress: examinations on menstrual cycle among medical students

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## ABSTRACT

**Background:** Premenstrual Syndrome (PMS), a common problem among adolescent girls, is associated with various physical, mental and behavioral symptoms that lead to social and occupational impairment. Stress has also been hypothesized to be an important etiologic factor. Examination stress may also be responsible for affecting the premenstrual symptoms. The objectives of this study was to study the impact of exam stress on the menstrual cycle and the relationship of perceived stress with the severity of premenstrual symptoms.

**Methods:** This was a cross-sectional observational study conducted among female medical students of final MBBS, who were candidate of upcoming exams. They were assessed on semi structured socio-demographic and menstrual history proforma, ACOG guidelines, DSM-5 criteria, Perceived Stress Scale (PSS) and Premenstrual Symptom Screening Tool (PSST).

**Results:** As per ACOG guidelines, 66% participants had PMS and 6% participants had PMDD according to DSM-5 criteria. On PSST total 88% participants had premenstrual symptoms and out of them 58% had mild/no PMS while 30% had moderate to severe PMS. 5% participants also fulfilled criteria for PMDD on PSST. Stress was found to be mild in 26% and moderate in 74% participants on PSS. PMS was found in 93.75% participants who had painful menstruation (dysmenorrhea) and this association was statistically significant. Data wise 73.1% participants having mild stress had PMS, while 93.2% participants having moderate stress, had PMS and this association was found to be statistically significant. Surprisingly not a single participant consulted to any health care provider for their menstruation related problems.

**Conclusions:** Premenstrual Syndrome is common in adolescent girls and exam stress is an important etiological factor. PMS/PMDD was found significantly higher in participants who had dysmenorrhea and moderate stress. A positive and highly significant correlation was also found between the severity of stress and severity of premenstrual symptoms.

**Keywords:** Premenstrual Syndrome, Premenstrual Dysphoric Disorder, Diagnostic and statistical Manual-5, Premenstrual Symptom Screening Tool, Perceived Stress Scale, American College of Obstetrician and Gynaecologists

## INTRODUCTION

Premenstrual syndrome (PMS) was defined by an NIMH Consensus workshop group as "A constellation of mood,

behavioral and/or physical symptoms that have a regular relationship to the luteal phase of menstrual cycle, are present in most if not all cycles and remit by the end of menstrual flow with a symptom free interval of at least one week each cycle.<sup>1</sup> Premenstrual syndrome is a common complication among the women of childbearing age.<sup>2</sup> Epidemiologic surveys have estimated that as many as 80% of women of reproductive age experience some symptoms attributed to the premenstrual phase of the menstrual cycle.<sup>3</sup> The American College of Obstetricians and Gynecologists (ACOG) published a revised practice bulletin in 2000 for the management of Premenstrual syndrome.<sup>4</sup>

A severe form of PMS, called as premenstrual dysphoric disorder (PMDD), significantly impairs the daily life activities in women. PMDD is distinguished from PMS by the severity and number of symptoms as well as the degree to which the function is impaired.<sup>5</sup>

Variety of factors such as change in hormone levels, chemical changes in brain have been hypothesized to be implicated in the etiology of PMS. Stress has also been found an important etiologic factor. The level of stress also relates to the severity of PMS.<sup>6</sup> Perceived stress in college settings may be due to academic stress of studying for examinations with respect to grade competition and large amount of content to master in a small amount of time. Thus it can be seen that the academic stress experienced by students appearing for exams may be responsible for affecting their menstrual symptoms.

Many girls, particularly college going, do suffer from either new appearance or exacerbation of these symptoms during examination and there are very few studies about stress and its relationship with menstrual disorders, hence this study was planned.

The objectives of this study are to study the impact of examination stress on menstrual cycle and relationship of perceived stress with the severity of premenstrual symptoms.

## METHODS

This study was conducted undergraduate female students of a medical college who were candidate of Final MBBS exams. This is a cross-sectional observational study. Convenient sampling method was used. The study was conducted from 01/06/2019 to 15/06/2019.

### Inclusion criteria

- Those above 18 years of age
- Having attained menarche
- Willing to give informed consent
- Candidate in university exams and
- Able to recall last 3 menstrual cycles.

### Exclusion criteria

- Pre-existing medical and gynaecological illnesses (anaemia, diabetes, hypothyroidism, asthma, migraine, epilepsy, pelvic inflammatory disease, endometriosis and amenorrhea).
- Using medications affecting menses (e.g., antidepressants, anticonvulsants or herbal medicines, hormones and vitamins) within the past three months.
- Presence of any other stressful life event within the past three months.

Total 137 participants were invited to achieve a desired number of 100 participants. 12 were unwilling to participate and 25 were excluded on the basis of exclusion criteria. Objectives and method of the study was explained and written informed consent was obtained after assuring about confidentiality of the data. Socio-demographic detail and menstrual history was taken from all the participants in semi structured proforma.

All participants were screened on Premenstrual Symptom Screening Tool (PSST) by enquiring detail about last 3 menstrual cycles after collecting. Stress was measured in all participants using Perceived Stress Scale - 10 (PSS-10).

Structured Clinical Interview was done in presence of a female Psychiatrist to confirm the diagnosis as per DSM-5. Data was analyzed using SPSS Version 18 and expressed in form of mean±standard deviation for continuous variables and percentage for categorical variables. Chi square test was used to find out significance of association and p<0.05 was considered as statistically significant.

### Instruments of the study

*Semi-structured proforma* - Used for evaluation of the participants which included socio demographic profile sheet and menstrual history profile sheet.

*Premenstrual Symptom Screening Tool (PSST)* - Devised by Steiner et al, for diagnosis of PMS and PMDD and very commonly used tool for the same. According to the study conducted by Yen et al, Cronbach's alpha of the first and second parts of PSST was 0.96 and 0.61, respectively.<sup>8</sup> The content validity of the first and second parts of this test was 0.93 and 0.8%, respectively. It is a 19-item instrument consisting of two domains:<sup>7</sup>

- First domain includes 14 premenstrual symptoms which must start before period and stop within a few days of bleeding- (1) anger/irritability, (2) anxiety/tension (3) tearful/increased sensitivity to rejection, (4) depressed mood/hopelessness, (5) decreased interest in work activities, (6) decreased interest in home activities, (7) decreased interest in social activities, (8) difficulty in concentrating, (9)

fatigue/lack of energy, (10) overeating/food cravings, (11) insomnia, (12) hypersomnia, (13) feeling overwhelmed or out of control and (14) physical symptoms: breast tenderness, headaches, joint/muscle pain, bloating, weight gain.

- Second domain includes 5 items which evaluates impact of symptoms on women's functioning as interference with - (a) work efficiency or productivity, (b) relationships with co-workers (c) relationships with family, (d) social life activities and (e) home responsibilities.

Each item is rated on a four point Likert scale as not at all, mild, moderate and severe in last 12 months duration during most of the cycles. For diagnosis of PMS, women must report at least five symptoms as moderate or severe from first domain where at least one should be from core symptoms (numbers 1-4). Also, they must report if their symptoms interfere moderately or severely with their ability to function in at least one of five items in the second domain.

While for diagnosis of PMDD, the following criteria must be present: (a) at least one of the core symptoms (1 to 4) as severe, (b) in addition, at least four of the symptoms (1 to 14) as moderate to severe from first domain and (c) at least one of symptom as severe from second domain.

*Perceived Stress Scale-10 (PSS-10)* - It was developed by Cohen and his colleagues and adopted to measure a global level of perceived stress. There are 10 questions in this scale asking about your feelings and thoughts during the last month.<sup>9</sup> Each item is rated on a 5-point Likert scale ranging from never (0) to almost always (4). Positively worded items (4, 5, 7, and 8) are reverse scored, and the ratings are summed across all 10 items.

Scores ranging from 0-13 is considered low stress, 14-26 is considered moderate stress while 27-40 is considered high perceived stress. A higher total score indicates a higher level of uncontrollable, unpredictable, and overwhelming feelings.<sup>10</sup>

*ACOG Guidelines* - The Key elements of a PMS identified by ACOG include the following:<sup>4</sup>

- Symptoms consistent with PMS- at least one of each of the following affective and somatic symptoms during the 5 days before menses.  
Affective: Depression, anger outbursts, irritability, anxiety, confusion, social withdrawal  
Somatic: Breast tenderness, abdominal bloating, headache, swelling of extremities
- Restriction of symptoms to the luteal phase of menstrual cycle.
- Confirmation of symptom pattern by prospective assessment.
- The symptoms cause functional impairment.

- Exclusion of other diagnosis that may better explain the symptoms.

**Ethical clearance:** First of all, approval was taken from the ethical committee of the medical college to conduct the study.

## RESULTS

Total 100 participants were analyzed. Mean age of participants was 20.94 years ranging from 19-24 years, 98% of them were Hindu and 68% belonged to nuclear family, 60% were hailing from urban locality while rest were from rural background (Table 1).

Mean age of menarche was 13.43 years ranging from 11-17 years. Mean duration of cycle was 28.61 days ranging from 22 - 40 days. Mean duration of flow was 4.69 days. 86% participants had duration of flow between 3-5 days and the rest had the blood flow for more than 5 days. Blood flow was reported scanty by 1%, normal by 87% and heavy by 12% of the total participants. Dysmenorrhea (painful menstruation) was reported by 64% participants. Intermenstrual bleeding wasn't reported by any of the participant (Table 2).

**Table 1: Distribution of participants according to socio-demographic profile.**

Variable		Number of participants (n=100)	Range
Age		Mean = 20.9 years	(19-24 Years)
Religion	Hindu	98	
	Non-Hindu	2	
Family type	Nuclear	68	
	Extended	9	
	Nuclear		
	Joint	23	
Locality	Urban	60	
	Rural	40	

Statistically 66% participants had PMS according to the ACOG guidelines (DSM-5) and 6% fulfilled the criteria for PMDD as per DSM-5. According to the PSST, 88 participants had one or more premenstrual symptoms out of which 58 had mild/no PMS and 30 had moderate to severe PMS, 5% participants were diagnosed as PMDD according to PSST. On Perceived Stress Scale, the stress was mild in 26% and moderate in 74% of the participants (Table 3).

Relationship of Premenstrual Syndrome to menstrual characteristics and perceived stress score. 93.75% of participants reporting dysmenorrhea were having Premenstrual syndrome and this association was found to be statistically significant (p value<0.05). Significant association was not found between presence of

premenstrual symptoms and duration of flow, regularity of cycles, amount of blood flow and duration of cycle (Table 4 and 5).

**Table 2: Distribution of participants according to characteristics of menstrual cycle.**

Variable	Number of participants (n=100)		Range
Mean age of menarche	13.4 years		(11-17 years)
Mean duration of cycle	28.6 days		(22 - 40 days)
Duration of flow	3-5 days	86	Mean duration of flow = 4.6 days
	>5 days	14	
Regularity of cycle	Regular	96	
	Irregular	4	
Blood flow	Scanty	1	
	Normal	87	
	Heavy	12	
Dysmenorrhoea	Present	64	
	Absent	36	
Inter-menstrual Bleeding	Present	0	
	Absent	100	

**Table 3: Distribution of participants according to menstrual/psychological problems.**

Variable	Number of participant (n=100)		Percent
PMS according to DSM-5 [ACOG criteria]	Yes	66	66 %
	No	34	34 %
PMDD according to DSM-5	Yes	6	6 %
	No	94	94 %
PMS according to PSST	No symptom of PMS	12	12 %
	Mild/No PMS	58	58 %
	Moderate/Severe PMS	30	30 %
PMDD according to PSST	Yes	5	5 %
	No	95	95 %
Perceived stress on PSS	Mild ( $\leq 13$ )	26	26 %
	Moderate (14-26)	74	74 %

PMS - Premenstrual Syndrome PMDD - Premenstrual Dysphoric Disorder, DSM 5 - Diagnostic and statistical Manual 5, PSST - Premenstrual Symptom Screening Tool PSS - Perceived Stress Scale ACOG - American College of Obstetrician and Gynecologists

**Table 4: Distribution of PMS/PMDD patients according to menstrual characteristics.**

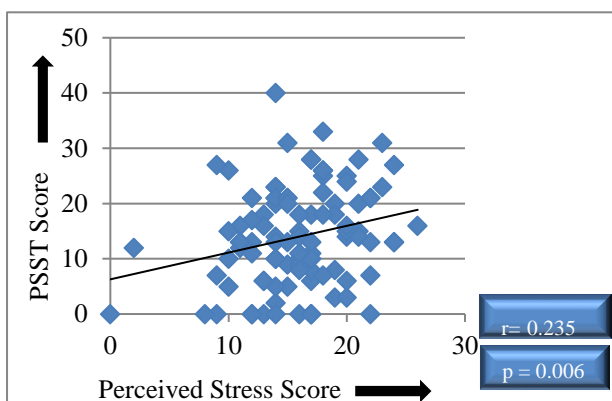
Menstrual characteristics		PMS/PMDD [According to PSST]		p value
		Present (n=88)	Absent (n=12)	
Dysmenorrhoea	Present (64)	60 (93.75%)	4 (6.25%)	0.01 Significant
	Absent (36)	28 (77.78%)	8 (22.22%)	
Duration of flow	3 –5 days (86)	75 (87.2%)	11 (12.8)	0.54
	> 5 days (14)	13 (92.85%)	1 (7.15%)	
Regularity of cycle	Regular (96)	84 (87.5%)	12 (12.5%)	0.45
	Irregular (04)	4 (100%)	0 (0%)	
Blood flow	$\leq$ Normal (88)	78 (88.63%)	10 (11.37%)	0.59
	Heavy (12)	10 (83.33%)	2 (16.66%)	
Duration of cycle	$\leq 30$ days (87)	75 (86.2%)	12 (13.8)	0.15
	>30 days (13)	13 (100%)	0 (0%)	

**Table 5: Distribution of PMS/PMDD patients according to Perceived Stress Score.**

Perceived Stress Score	PMS/PMDD		p value
	Present (n=88)	Absent (n=12)	
Mild stress ( $\leq 13$ )	19(73.1%)	7(26.9%)	0.006 Highly Significant
Moderate stress (14-26)	69(93.2%)	5(6.8%)	

Among the participants who had mild stress, 73.1% were having Premenstrual Syndrome, while in participants with moderate stress, 93.2% were having Premenstrual Syndrome and this association between stress and presence of premenstrual symptoms was found to be statistically significant (p value < 0.05).

A highly significant correlation was found between PSS score and PSST score (p value = 0.006,  $r = 0.235$ ) explaining that as the stress increases, severity of premenstrual syndrome also increases (Figure 1).

**Figure 1: Distribution of PSST score and PSS score in participants.**

## DISCUSSION

The current study has a special aim at assessing the impact of examination stress on menstrual cycle in young medical students, when they are more prone to emotional and psychological burnout. Relationship in severity of perceived stress with the severity of premenstrual symptoms was also analyzed.

The mean age of participants was 20.94 years ranging from 19- 24 years. Premenstrual syndrome (PMS) is quite prevalent among women of reproductive age. Nisar M et al. found mean age of participants 21.2 ranging from 18 - 25.<sup>11</sup> Most of the participants (52.66%) were from age group 21 to 24 in a study done by Bakhshani NM et al.<sup>12</sup> Similarly Issa BA et al, in their study found that mean age of the participant was 21.3 years ranging from 16 - 38 years.<sup>13</sup> Nourjah P in a study in university students found that age of participants ranged from 18 - 24 years.<sup>14</sup> Singh

P et al. found mean age of the participants 18.9 years ranging from 17 to 30 years.<sup>15</sup>

The mean age of menarche was 13.43 years and mean duration of cycle was 28.61 days. Mean duration of blood flow was 4.69 days. Dysmenorrhea (painful menstruation) was reported by 64% of the total participants. Statistically significant association was found between dysmenorrhea and PMS/PMDD (p value < 0.05). Mahin Delara et al, in 2013 also found in their study in Iranian adolescent girls that those with dysmenorrhea were more likely to be classified as having PMS and PMDD.<sup>16</sup>

Statistically 66% participants had PMS and only 6% had PMDD according to the DSM-5 criteria. Mishell DR et al, also estimated that 75-85% of menstruating women experience some uncomfortable symptoms during the premenstrual phase of their cycles.<sup>17</sup> Banerjee et al, reported 6.4% prevalence of PMDD in Indian women.<sup>18</sup>

On PSST, 88% participants reported having premenstrual symptoms out of which 58% had mild/no PMS and 30% had moderate to severe PMS. Author are in agreement with the study by Steiner et al, who reported severe PMS in 21.3% of adolescent girls, 5% of total participants were diagnosed as PMDD according to PSST. This study is in agreement with the study by Steiner et al, who reported its prevalence to be 8.3%.<sup>19</sup> Higher number of cases of PMS/PMDD by PSST can be due the fact that even a single positive response of participant categorizes her into No/mild PMS.

This study reports that mild stress was found in 26% and moderate stress in 74% of the participants. Among participants showing mild stress, 73.1% were having PMS/PMDD while in subjects having moderate stress, 93.2% were having PMS/PMDD and this association between stress and premenstrual symptoms was found to be statistically significant (p value < 0.05). Czaikowska M et al, in 2015 also found that stress of competitive sports and intensity of training are conducive to PMS.<sup>20</sup>

The study finds highly significant correlation between PSS score and PSST score (p value = 0.006,  $r = 0.235$ ) explaining as the perceived stress increases, severity of premenstrual symptoms also rises. Lustyk et al, found significantly more perceived stress in the high symptom group compared to the low symptom group.<sup>21</sup>

The study has certain limitations, it included a highly selective sample of undergraduate medical college students. Premenstrual symptoms were reported based on retrospective recall of the participants adding a recall bias. As there was no prospective diary charting of PMS symptoms, the prevalence rates are of "provisional diagnosis" according to DSM-5 criteria. Findings of this study needs to be replicated by community based large cross sectional survey to obtain more precision.



## CONCLUSION

Premenstrual syndrome is common in adolescent girls. Highly significant correlation between the severity of stress of exams and PSST score suggests that stress is responsible for either increase in the severity or new appearance of premenstrual symptoms. Statistically significant correlation between Premenstrual syndrome and dysmenorrhea suggests that every women reporting painful menstruation should be thoroughly screened for presence of Pre-menstrual syndrome or Pre-menstrual dysphoric disorder.

Final year MBBS students having menstruation related problems, despite affecting their work efficiency, did not consult to healthcare provider probably considering it either as a normal phenomenon or due to their hesitation. Simultaneously there is a need of orientation of women's health care providers about role of stress in Premenstrual Syndrome or Pre-menstrual dysphoric disorder.

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## REFERENCES

- Hamilton JA, Parry BL, Alagna S, Blumenthal S, Herz E. Premenstrual mood changes: A guide to evaluation and treatment. *Psychiatr Ann*. 1984;14(6):426-35.
- Mirghafourvand M, Asghari Jafarabadi M, Ghanbari-Homayi S. Comparison of the diagnostic values of premenstrual syndrome screening tool (PSST) and daily record of severity of problems (DRSP). *J Babol Univer Med Sci*. 2015;17(8):27-33.
- Steiner M, Macdougall M, Brown E. The premenstrual symptoms screening tool (PSST) for clinicians. *Archives of Women's Mental Health*. 2003;6(3):203-9.
- ACOG Practice Bulletin: Premenstrual Syndrome, *Int J Gynecol Obstet*. 2001;73:183-91.
- Yonkers K, O'Brien P, Eriksson E. Premenstrual syndrome. *Lancet*. 2008;371(9619):1200-10.
- Ekpenyong CE, Davis KJ, Akpan UP, Daniel NE. Academic stress and menstrual disorders among female undergraduates in Uyo, South Eastern Nigeria-the need for health education. *Niger J Physiol Sci*. 2011;26(2):193-8.
- Hariri FZ, Moghaddam-Banaem L, Bazi SS, Malehi AS, Montazeri A. The Iranian version of the Premenstrual Symptoms Screening Tool (PSST): a validation study. *Archives Women's Mental Health*. 2013;16(6):531-7.
- Yen JY, Chang SJ, Long CY, Tang TC, Chen CC, Yen CF. Working memory deficit in premenstrual dysphoric disorder and its associations with difficulty in concentrating and irritability. *Comprehensive Psychiatr*. 2012;53(5):540-5.
- Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behaviour*. 1983;24:385-96.
- Cole SR. Assessment of differential item functioning in the Perceived Stress Scale-10. *J Epidemiol Commu Health*. 1999;53(5):319.
- Nisar N, Zehra N, Haider G, Munir AA, Sohoo NA. Frequency, intensity and impact of premenstrual syndrome in medical students. *J Coll Physicia Surg Pak*. 2008;18(8):481-.
- Bakhshani NM, Mousavi MN, Khodabandeh G. Prevalence and severity of premenstrual symptoms among Iranian female university students. *J Pak Med Assoc*. 2009;59(4):205-8.
- Issa BA, Yussuf AD, Olatinwo AW, Ighodalo M. Premenstrual dysphoric disorder among medical students of a Nigerian university. *Ann African Med*. 2010;9(3).
- Nourjah P. Premenstrual syndrome among teacher training university students in Iran. *Anxiety*. 2008;145:45-3.
- Singh P, Kumar S, Kaur H, Swami M, Soni A, Shah R, et al. Cross sectional identification of Premenstrual syndrome and Premenstrual dysphoric disorder among college students: a preliminary study. *JPP*. 2015;9(155).
- Delara M, Borzuei H, Montazeri A. Premenstrual disorders: prevalence and associated factors in a sample of Iranian adolescents. *Iran Red Cres Med J*. 2013;15(8):695.
- Mishell JD. Premenstrual disorders: epidemiology and disease burden. *Am J Managed Care*. 2005;11:473-9.
- Banerjee N, Roy KK, Takkar D. Premenstrual dysphoric disorder--a study from India. *Intern J Fertile Women's Med*. 2000;45(5):342-4.
- Steiner M, Peer M, Palova E, Freeman EW, Macdougall M, Soares CN. The Premenstrual Symptoms Screening Tool revised for adolescents (PSST-A): prevalence of severe PMS and premenstrual dysphoric disorder in adolescents. *Archi Women's Mental Health*. 2011;14(1):77-81.
- Czajkowska M, Drosdzol-Cop A, Gał azka I, Naworska B, Skrzypulec-Plinta V. Menstrual cycle and the prevalence of premenstrual syndrome/premenstrual dysphoric disorder in adolescent athletes. *J Pediatr Adolesc Gynecol*. 2015;28:492-8.
- Lustyk MK, Widman L, Paschane A, Ecker E. Stress, quality of life and physical activity in women with varying degrees of premenstrual symptomatology. *Women Health*. 2004;39(3):35-44.

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