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Original

## A Questionnaire Study on the Prevalence of Premenstrual Syndrome, Premenstrual Dysphoric Disorder, and Related Coping Mechanisms among Female Medical Students

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**Introduction:** Premenstrual syndrome (PMS) afflicts 20-50% of all women of reproductive age, whereas premenstrual dysphoric disorder (PMDD) affects only 3-7% of women in this group. However, there has been little research regarding PMS/PMDD and associated coping methods in Japan since the recognition of this condition 10 years ago. In the current study, we examined existing knowledge about both PMS and PMDD, as well as their prevalence, among medical students at Tokyo Women's Medical University.

**Materials and Methods:** This was a cross-sectional questionnaire study. We presented the questionnaire to 108 third-year and 65 sixth-year students in the medical department. The questionnaire was compiled, in part, with reference to portions of the diagnostic basic standard in the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition Text Revision (DSM-IV-TR).

**Results:** Complete questionnaires were returned by 147 students, with an 84.9% return rate. Thirteen students (8.8%) met the diagnostic standard for PMDD and 37 (25.2%) met the diagnostic standard for PMS. Eleven students (7.5%) had no symptoms either before or during their periods. Respondents who received pharmacological treatment accounted for 27.1% of the third-year students and 45.2% of the sixth-year students. In addition, respondents who had received non-pharmacological treatment accounted for 22.4% of the third-year and 45.2% of the sixth-year students.

**Conclusion:** Results from this study highlight the need for further guidance and self-care education regarding menstruation-related conditions and symptoms.

**Key Words:** premenstrual syndrome, premenstrual dysphoric disorder, medical students, coping mechanisms

### Introduction

Menstruation-related ailments such as premenstrual syndrome (PMS), premenstrual dysphoric disorder (PMDD),

and dysmenorrhea can obstruct the health of women of reproductive age<sup>1,2)</sup>. According to the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition Text Revision (DSM-IV-TR), although PMS is seen in 20-

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**Table 1** Do you experience some or any of the following mental and physical symptoms pre- and intra-menstruation during the last year?

	3rd year students N=85			6th year students N=62		
	Yes	Sometimes	Not at all	Yes	Sometimes	Not at all
#1 Anger/irritability	6 (7.0%)	17 (20.0%)	62 (73.0%)	5 (8.1%)	20 (32.2%)	37 (59.7%)
#2 Anxiety/tension	11 (13.0%)	24 (28.2%)	50 (58.8%)	9 (14.5%)	32 (51.6%)	21 (33.9%)
#3 Tearful/increased sensitivity to rejection	5 (5.9%)	22 (25.9%)	58 (68.2%)	7 (11.3%)	21 (33.9%)	34 (54.8%)
#4 Depressed mood/hopelessness	7 (8.2%)	23 (27.1%)	55 (64.7%)	7 (11.3%)	23 (37.1%)	32 (51.6%)
#5 Decreased interest in work, home, or social activities	5 (5.9%)	23 (27.1%)	57 (67.0%)	5 (8.1%)	20 (32.2%)	37 (59.7%)
#6 Difficulty concentrating	7 (8.2%)	29 (34.1%)	49 (57.7%)	18 (29.0%)	28 (45.2%)	16 (25.8%)
#7 Fatigue/lack of energy	8 (9.4%)	33 (38.8%)	44 (51.8%)	11 (17.7%)	37 (59.7%)	14 (22.6%)
#8 Overeating/food cravings	21 (24.7%)	27 (31.8%)	37 (43.5%)	12 (19.4%)	33 (53.2%)	17 (27.4%)
#9 Hypersomnia or insomnia	23 (27.1%)	20 (23.5%)	42 (49.4%)	24 (38.7%)	31 (50.0%)	7 (11.3%)
#10 Feeling overwhelmed or out of control	6 (7.1%)	17 (20.0%)	62 (72.9%)	8 (12.9%)	19 (30.6%)	35 (56.5%)
#11 Physical symptoms: breast tenderness, headaches, joint/muscle pain, bloating, weight gain	21 (24.7%)	17 (20.0%)	47 (55.3%)	19 (30.7%)	25 (40.3%)	18 (29.0%)

50% of women, and PMDD in 3-7%, there is still no official nationwide survey on this topic in Japan<sup>3)</sup>. Relying on the few existing internet surveys on the topic, one report that 85.9% of 5,000 interviewed women feel that their pre-menstrual symptoms are quite unpleasant<sup>4)</sup>, while others put the occurrence of PMDD at up to 8.7% of all women of reproductive age, which is higher than the DSM-IV-TR estimates<sup>5)~7)</sup>.

Some studies have been conducted on treatment methods for menstruation-related symptoms with nurses and general university students as participants; however, no study has examined female students' experiences with these conditions while active in various fields of medicine<sup>5)~9)</sup>. As such, this study will be useful to understand the degree to which women with medical knowledge are concerned about these conditions.

Our research questions in this study were as follows: (1) What is the prevalence of PMS and PMDD among medical students? (2) Do menstruation-related symptoms impair daily life and interpersonal relationships? (3) Do subjective menstruation-related symptoms change with an increase in medical knowledge? (4) What type of self-control is applied in relation to these conditions? (5) Does the severity of symptoms change under stress? (6) What will be needed in terms of education in the future?

## Materials and Methods

The study was conducted with 173 students at the Tokyo Women's Medical University, including 108 third-year and 65 sixth-year students. Their ages ranged from 20 to

32 years, with a mean age of  $22.7 \pm 2.1$  years.

A questionnaire was used to collect the data, and was distributed to third-year students during the influenza vaccination period in November 2013, and to sixth-year students in December, after a lecture. The students were instructed to fill out the questionnaire, which was collected immediately upon completion in the same setting.

The questions were categorized into items A, B, C, D, and E. Item A questions were based on the research criteria for PMDD from DSM-IV-TR and were related to the presence or absence of subjective mental and physical symptoms before and during menstruation during the last year, as shown in **Table 1**<sup>3)</sup>. In item B, the level of agreement with the questions in item A was evaluated on an ascending scale of 1 to 5 with regard to avoidance of social activities, lower productivity and efficiency at school and/or work, and impairment of interpersonal relationships. Item C questions were related to responses to the psychological and physical subjective symptoms described in item A, which were observable before or during menstruation. Item D questions were related to factors or triggers that led to the exacerbation of the symptoms stated in item A. Item E questions, which were inquiries about PMS, were each asked in a semi-structured manner.

Statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS) software. Responses to each item by the two groups (i.e., third- and sixth-year students) were compared using the chi-square test.

This research project was submitted to and approved

**Table 2** Prevalence of PMDD and PMS among medical students.

	3rd year students N=85	6th year students N=62	Total N=147
PMDD	4 (4.7%)	9 (14.5%)	13 (8.8%)
PMS	21 (24.7%)	16 (25.8%)	37 (25.2%)
Any Symptom (Sometimes)	49 (57.7%)	37 (59.7%)	86 (58.5%)
No Symptom	11 (12.9%)	0 (0.0%)	11 (7.5%)

PMDD: At least one of #1, #2, #3, #4 is “yes”; in addition, four of #1 to #11 is “yes”; category B is “very much” or “yes”.

PMS: at least one of #1 to #11 is “yes”; category B is “very much” or “yes”.

by (No. 2990) the ethics committee of Tokyo Women’s Medical University. A document explaining the aims of the study was attached to the survey questionnaire given to participants.

## Results

### 1. Symptoms occurring before or during menstruation (Table 1)

Complete questionnaires were returned by 147 students, with an 84.9% return rate. Among third-year students, those who answered, “not at all” to all the items were in the majority. Most respondents who did not answer “not at all” noted physical symptoms such as “a notable change in appetite, overeating, or craving a particular food,” “hypersomnia or insomnia,” and “breast pain and swelling, headache, joint or muscle pain, and weight gain.” In addition, the answers provided by most respondents for occasionally present symptoms included psychiatric symptoms such as an “awareness of difficulty concentrating” and a “lack of motivation, fatigue, or a marked loss of willpower.”

Among the sixth-year students, the majority of respondents answered “sometimes” to 6 of 11 questions. In addition, the symptoms, “awareness of difficulty concentrating,” “hypersomnia or insomnia,” and “breast pain and swelling, headache, joint or muscle pain, and weight gain” were constantly noticed by most respondents. The findings revealed that physical symptoms were noticed by many respondents, including those who answered that physical symptoms were “sometimes” present.

**Table 3** Evaluate on five grades how much the symptoms mentioned in A influenced your normal social activities, study, work, efficiency, and/or if the output of the activities then severely diminished.

	3rd year students	6th year students
Very much	3 (3.5%)	5 (8.1%)
Yes	27 (31.8%)	31 (50.0%)
Don’t know	16 (18.8%)	3 (4.8%)
No	23 (27.1%)	15 (24.2%)
Definitely not	16 (18.8%)	8 (12.9%)

### 2. Prevalence of PMDD and PMS (Table 2)

Among third-year students, four respondents (4.7% of the total) met the diagnostic criteria for PMDD, 21 (24.7%) met the diagnostic criteria for PMS, and 49 (57.7%) showed some symptoms. Eleven respondents (12.9%) did not show any symptoms at all. Among the sixth-year students, 9 respondents (14.5%) met the diagnostic criteria for PMDD and 37 (59.7%) met the diagnostic criteria for PMS. All of the participants showed symptoms.

If the total number of respondents is taken into account, 13 respondents (8.8%) met the diagnostic criteria for PMDD, 37 (25.2%) met the diagnostic criteria for PMS, and 86 (58.5%) showed some symptoms. Eleven respondents (7.5%) showed no symptoms at all.

### 3. Impact of symptoms occurring before menstruation on respondents’ work, studies, social activities in daily life, and relationships with other people (Table 3)

More sixth-year students in relation to third-year noticed impairments in their daily lives and social activities due to symptoms. In total, 35.3% of third-year students reported having had such impairments, compared to 58.1% of sixth-year students.

### 4. Third- and sixth-year students’ exposure to treatment for their premenstrual symptoms (Table 4)

Respondents who received pharmacological treatment accounted for 27.1% of the third-year students and 45.2% of the sixth-year students. In addition, respondents who had received non-pharmacological treatment accounted for 22.4% of the third-year students and 45.2% of the sixth-year students. There were statistically signifi-

**Table 4** How do you cope with the encountered symptoms mentioned in A before and during menstruation?

	3rd year students (N=85)	6th year students (N=62)	p-value
Pharmacological	23 (27.1%)	28 (45.2%)	0.02
PMDD	4 (4.7%)	5 (8.1%)	0.506
PMS	9 (10.5%)	10 (16.1%)	0.236
Others	11 (12.9%)	13 (21.0%)	0.175
Non-pharmacological	19 (22.4%)	28 (45.2%)	0.003
PMDD	2 (2.4%)	3 (4.8%)	0.568
PMS	7 (8.2%)	10 (16.1%)	0.077
Others	10 (11.8%)	15 (24.2%)	0.036
Together	9 (10.6%)	15 (24.2%)	0.027
PMDD	1 (1.2%)	2 (3.2%)	0.912
PMS	5 (5.9%)	6 (9.7%)	0.366
Others	3 (3.5%)	7 (11.3%)	0.061
No treatment	52 (61.2%)	20 (32.3%)	0.001
PMDD	0 (0.0%)	3 (4.8%)	0.188
PMS	10 (11.8%)	2 (3.2%)	0.023
Others	42 (49.4%)	16 (25.8%)	<0.001

cant differences between third-year students and sixth-year students in the case of pharmacological treatment ( $p=0.02$ ) and in the case of nonpharmacological treatment ( $p=0.003$ ).

Among the commercially available therapeutic agents, the following were frequently listed in participant responses:

- Loxoprofen sodium hydrate (22 respondents)
- Desogestrel - ethinyl estradiol (7 respondents)
- Ibuprofen (4 respondents)
- Non-steroidal anti-inflammatory drugs (4 respondents)
- Others: diclofenac sodium, acetaminophen, aspirin, ibuprofen-allylisopropylacetylurea, Chinese traditional medicine, headache medication, and so forth.

In addition, the specific contents of those who received non-pharmacological treatment were as follows: “Warming one’s own body” (9 respondents), “Exercising and stretching” (13 respondents), and “Getting some sleep” (12 respondents). Other responses included eating favorite foods, drinking coffee, limiting intake of sweets, taking a bath, doodling, eating fresh foods, and, conversely, some noted that they refrained from drinking coffee or alcohol.

### 5. Change in the severity of symptoms before or during menstruation according to one’s period

Fifty respondents (34%) answered that the severity of

their symptoms changed depending on the period. Ninety-seven (66%) respondents answered that there were no changes in the symptoms across periods. In addition, 31% of the third-year students and 39% of the sixth-year students answered that the exacerbation of symptoms depended on the period.

The following responses were given by participants who were asked about when their symptoms increased in severity:

- Before academic examinations (22 respondents)
- When facing a stressful situation (5 respondents)
- When lacking sleep (2 respondents)
- Others wrote “when busy” and “before sport matches”

### 6. Respondents’ comments and questions

The respondents’ comments in response to the last question on the questionnaire, “Questions and things that you want to know about premenstrual syndrome,” included the following:

- Why is there an increase in appetite before menstruation?
- Is it (premenstrual syndrome) a treatable condition?
- Are there ways to get rid of the feeling of drowsiness without using medication?
- How can menstrual cramps be alleviated?
- I would like to know about the physical changes associated with premenstrual abdominal pain.

## Discussion

The present study found PMDD in 8.8% of participants and PMS in 25.2%, while 7.5% of participants did not experience any trouble or show symptoms of either condition before or during menstruation. Additional epidemiological studies are needed concerning PMS and PMDD among university students.

With regard to the frequency of PMS and PMDD, Komura et al. reported 20.4% for moderate and severe PMS, and 4.0% for PMDD<sup>5)</sup>, whereas Hamanishi reported 17.8% for PMS and 1.8% for PMDD<sup>6)</sup>. In a study by Takeda et al. on senior high school students, a percentage of 11.8% was reported for PMS and 2.6%, for PMDD<sup>7)</sup>. Taking into account these data, symptoms of PMS and PMDD met the diagnostic standard in many

cases.

Reflecting on reasons why the diagnostic standard was reached in so many cases in this study, we assume that this was due to that medical students increased knowledge about diagnosis criteria and treatment about PMS and PMDD with the result that their self-awareness are increased. Also it is the fact that the curriculum in the Medical Department was, understandably, perpetually stressful. There are no previous studies in this regard on medical students and doctors. However, studies on nurses and nursing students reported that, compared to students at non-medical vocational colleges, with increasing knowledge, the nursing students were more likely to take adequate measures against pre-menstrual symptoms. However, since stress levels can be higher among medical students, the frequency with which they complain about pre-menstrual symptoms is also higher<sup>9)</sup>. Hamanishi further compared students at non-medical universities with veteran and new nurses and found that a higher level of knowledge about and interest in PMS is associated with a higher likelihood of young nurses seeking out specialized treatment for the condition<sup>6)</sup>.

Both PMDD and PMS were found to be significantly more common among pre-examination sixth-year students, as compared to third-year students. As previously stated, increased knowledge of sixth-year students regarding PMS and PMDD, as a result of being in contact with actual patients during their clinical training, helped them become more aware of their own symptoms.

The current study was conducted before the national license examinations, which are periods of extreme stress; this could be one of the reasons why symptoms were noted as having worsened. Furthermore, specific to students in their sixth year, respondents' average score on the General Health Questionnaire 30 (GHQ-30) was high, yielding poor overall mental health; therefore, a PMS/PMDD diagnosis might have been reached easily in many cases<sup>10)</sup>.

The self-perceived symptoms of third-year students included increased appetite, insomnia, and physical symptoms, whereas those of sixth-year students included self-awareness of difficulties with concentrating in addition to insomnia and physical symptoms. In other studies, symptoms and complaints comprised mostly physical symptoms and eating and sleeping disorders<sup>5)11)12)</sup>. This re-

vealed similarities among third-year students across contexts. A notable finding among sixth-year students was their self-awareness of difficulties with concentrating. Since they were busy preparing for examinations, a higher number of instances in which their concentration was required probably enhanced self-awareness of such symptoms.

Third-year students thought that pre- and intra-menstrual symptoms hindered social activities, but only half of the sixth-year students were of this opinion. Likewise, sixth-year students took significantly more therapeutic counter-measures than did third-year students. According to Hamanishi's report, 70% of nurses on duty answered, "Yes," to the question on whether work-related stress had any influence on PMS/PMDD. The same percentage (70%) answered, "Yes," to the question on whether symptoms of PMS/PMDD had any influence on their work. The answers of sixth-year students were, thus, quite similar to those of nurses at work<sup>6)</sup>.

About one-third of all students answered that the severity of pre- and intra-menstrual symptoms changed according to periods. Factors that brought about such changes were examinations, stress, and insufficient sleep. With the increased medical knowledge of sixth-year students, self-awareness regarding symptoms was higher, and the number of individuals taking appropriate counter-measures was also high. Stress has also been shown to worsen symptoms, before examinations. Sixth-year students had advanced medical knowledge helping them to be self-aware of symptoms and take appropriate counter measures, although pre-examination stress worsened the symptoms, as indicated above. Takeda et al. studied Japanese senior high school students and found that the PMS/PMDD rate was actually higher among this group than among women who had reached their thirties<sup>12)</sup>. Chronic stress throughout examinations was identified as a possible, important reason. Hamanishi pointed out that, in conjunction with the progress made by women in the labor market, information about symptoms related to menstruation, such as PMS/PMDD, should be provided<sup>6)</sup>. Hamanishi further argued that appropriate mental health measures that take female-specific health concerns into account are necessary<sup>6)</sup>. Akimoto et al. assumed that, for women with PMDD, a positive perception of stressful events might help prevent premenstrual



symptoms<sup>13</sup>). Female medical students, who are likely to oversee female health concerns in the future, will require thorough education through the provision of ample information about menstrual problems and coping with stress from the lower year levels up to sixth year.

Menstruation-related symptoms were more pronounced in sixth-year students than in third-year students. Third-year students were experiencing puberty, during which there is anovulation with only few secretions of progesterone. In contrast, sixth-year students were much closer to mature reproductive age, and, thus, were more receptive to the influences of estrogen and progesterone secretion. Matsumoto et al. reported that menstruation-related symptoms begin in puberty and reach their peak around age 30, when the cycle of estrogen and progesterone secretion becomes very pronounced<sup>11</sup>. This also coincides with the age range of our study participants; however, regularity or irregularity of the menstrual cycle, or whether menstruation is ovulatory or anovulatory, were not covered. In further studies, the above factors should be asked about in the questionnaire, to better understand the interrelationships between menstrual cycle, basal temperature, and menstruation-related symptoms.

Among the methods used to cope with menstruation-related symptoms, pharmaceutical approaches such as pain killers were most frequent. Our study questionnaire asked what kind of medicine for self-treatment was used, and found that times of pre- and intra-menstrual pain were most frequently symptoms in the result of our study. In their report, Matsumoto et al. stated that premenstrual symptoms of discomfort between the ages of 10 and 19 are often accompanied by backaches and abdominal pain; during menstruation, the same symptoms were also characterized as frequent<sup>11</sup>. Pain killers, then, are used during occurrences of these symptoms, whether pre- or intra-menstrual discomfort symptoms. The results underscore the need for menstruation-related education as early as possible, but also for continued research on the actual state and follow-up examinations of students at all year levels. Dysmenorrhea is often included in the above symptoms and coping methods; however, this study did not survey the prevalence of dysmenorrhea. As such, future studies should include this item on the questionnaire about pre- and intra-menstrual symptoms.

Since this study was conducted using a questionnaire, this poses several limitations insofar as there were no definite diagnoses by a specialist. In a definite diagnosis, in a two-cycle menstrual phase, there must prospectively always be symptoms<sup>3</sup>). Moreover, the Premenstrual Symptoms Screening Tool (PSST) developed by Steiner et al. consists of four steps, whereas there were only three in this questionnaire<sup>14,15</sup>). Therefore, there may have been participant uncertainties about many parts of the questionnaire. Future research should employ new questions to address these issues and include students of all grades.

## Conclusion

The findings of this survey confirmed that the prevalence of PMDD and PMS among female medical students was slightly higher than that among Japanese women. One third of students felt that pre-menstrual symptoms impaired their daily lives and interpersonal relationships. The prevalence of PMDD and PMS might be influenced by circumstances in higher education, stress, aging, and poor mental health. This study suggests that in the future, fact-finding surveys will need to be conducted among medical school students at all levels and that continuous follow-up is required.

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**Conflicts of Interest:** The authors indicated no conflicts of interest.

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