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ORIGINAL ARTICLE

THE PREVALENCE OF PREMENSTRUAL SYNDROME AND ITS EFFECT ON ACADEMIC AND SOCIAL PERFORMANCE OF FEMALE MEDICAL STUDENTS, ADDIS ABABA UNIVERSITY: A CROSS-SECTIONAL STUDY

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ABSTRACT

Introduction: *Premenstrual syndrome (PMS), a common cyclic disorder of young and middle-aged women, is characterized by emotional and physical symptoms that consistently occur during the luteal phase of the menstrual cycle.*

Objective; *The primary objective of the study was to determine the prevalence of premenstrual syndrome and its effect on academic and social performance among medical students of the College of Health Sciences, Addis Ababa University.*

Methods: *A cross-sectional descriptive study was done among systematically selected female medical students of the College of Health Sciences, Addis Ababa University, Addis Ababa, Ethiopia in March 2019. A self-administered semi-structured questionnaire was used to collect data from 226 Students during the study period and data was analyzed using SPSS 25.0.*

Results: *Among the respondents, 129(57%) students fulfilled the Diagnostic and Statistical Manual of Mental Disorders V (DSM V) criteria for premenstrual syndrome. Hundred and four (53%) of the participants reported academic performance impairment in their learning activities. Among those who reported performance impairment due to PMS, 67(29.6%) reported missing class lectures, seminars, bed sides or rounds, 11(4.8%) missed examination and 3(1.3%) of them reported withdrawal from their study. Hundred and two (52.9%) participants reported impairment in their social life activities. Body Mass Index of <18.5 kg/m2 with AOR =3.01, 95% CI (1.71-6.3), p=0.02 and age of menarche between 13 and 15 years with AOR=6.12, 95% CI (1.99-19.8), p=0.01 showed statistically significant association with premenstrual syndrome.*

Conclusion: *Our study revealed a high prevalence and negative impact of PMS on academic performance and social life activities of female medical students of Addis Ababa University. Strategies to reduce PMS related wastage need to be considered by training institutions. An in-depth look in to the problem from different perspectives across diverse dimensions is recommended.*

Keyword: *Premenstrual syndrome, Female Medical students, Addis Ababa university*

INTRODUCTION

Premenstrual syndrome (PMS), also called late luteal phase dysphoric disorder in previous versions of the Diagnostic and Statistical Manual (DSM) is the severe variant of premenstrual dysphoric disorder (PMDD). It is characterized by the presence of physical and/or behavioral symptoms that occur repetitively in the second half of the menstrual cycle and often the first few days of menses (1). These include somatic symptoms (breast tenderness, abdominal bloating, swelling, and headache) and affective symptoms (depression, irritability, anxiety, confusion, and social withdrawal), which increase in severity during the last part of the luteal phase (2, 3). Nearly 300 different symptoms have been reported and typically include both psychological/emotional and physical complaints (4).

Nearly 80% of menstruating women report one or more symptoms characteristic of PMS (5, 6). It is difficult to determine the true prevalence because of self-treatment, difference in availability and access to medical care, definition & diagnostic criteria and cultural practices. Severity of PMS strongly correlates with impairment of social and occupational/school performance (10). Stress has been found to be one factor to increase the prevalence and severity of PMS. This is justified in many studies as it is found more in high-level educated people and it is more severe compared with those women who were not educated. The prevalence of PMS is not known in Ethiopia because it is not taken as public health problem(11). Currently, neither PMS nor PMDD are reflected as official diagnoses by DSM-IV.

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PMDD appears as a "depressive disorder not otherwise specified". According to the American Psychiatric Association, the new proposed changes would actually recognize PMDD as a disorder. The pathophysiology of PMS has never been fully known but it can be multifactorial. It may include the effect of progesterone on neurotransmitters such as serotonin, opioids, catecholamine and Gamma amino butyric acid (GABA), increased prolactin level or increased sensitivity to the effect of prolactin, insulin resistance, sensitivity to endogenous hormones, abnormal hypothalamic-pituitary-adrenal axis function, nutritional deficiencies, alteration of glucose metabolism, and fluid and electrolyte imbalance (12,13-15).

There are only few studies in Ethiopia that investigated the prevalence and impacts of PMS on female university students and they used DSM IV diagnostic criteria; unlike this study, where the recent DSM-V criteria are used. In addition, there are only few reports that included data on premenstrual work/school or social impairment. This study generated data on the prevalence and impact of PMS on female medical students that can serve as baseline for further in-depth studies in higher educational institutions to help them design strategies and interventions to address the problem. It also gives information on the magnitude of the problem in the institution which helps the management body, instructors and parents to give adequate attention and support to female medical students.

This was conducted to determine the prevalence of premenstrual syndrome and its effect on academic and social performance of female medical students at Addis Ababa University, College of Health Sciences. It specifically aimed to determine the prevalence of premenstrual syndrome among female medical university students of Addis Ababa University, identify socio-demographic and educational factors associated with the severity of the symptoms, and define the academic and social performance of female medical students with Premenstrual Syndrome

PATIENTS AND METHODS

The study was done in the College of Health Sciences (CHS), Addis Ababa University (AAU), in Ethiopia. The study was conducted in March, 2019. A cross-sectional descriptive analysis was carried out on data obtained from systematically selected female medical students of College of Health Sciences, Addis Ababa University, Ethiopia. Each participant was given information on the study and written consent was taken from those willing to participate. The sample size was determined by using single proportion formula taking the prevalence of PMS of 83.2% from a study done at Mekelle University in 2014 and assuming 95% CI, 5% precision and 15 % non-response rate to be 247. The total number of female medical students was 401. Therefore, when the proportion of the total female students to the sample size was calculated, it was nearly 2. Therefore, through systematic sampling, data was collected from every second female student after randomly choosing a female student to begin the sampling.

Medical students who had a regular menstrual period in at least the previous three consecutive months and who were enrolled in undergraduate medical studies were included in the study. Students who were pregnant during the study period, those with history of known chronic illnesses such as diabetes, high blood pressure, heart disease or current depression, anxiety and any other psychiatric disorders, those students currently using hormonal methods of contraception were excluded from the study.
Ethical clearance was obtained from the institutional review board (IRB) of CHS, AAU. In order to keep confidentiality of any information provided by study subjects, the data collection procedure was made anonymous.

Data was collected by using semi-structured questionnaire in English. A questionnaire was designed with the help of DSM V definition of PMDD and Premenstrual symptom screening tool (PSST) for clinicians. The questionnaire was pretested and modifications were made. Data was entered in to SPSS version 25 statistical package. Coding of individual questionnaires was checked before data entry in to the software. Further data cleaning was performed to check for outliers, missed values and any inconsistencies before the data was analyzed using the software. Chi-square and independent t-test were used to see the association between dependent and independent variables. A confidence limit of 95% and *P*- value less than 0.05 was used as a cut-off point for statistical significance.

To control the effect of confounding variables, a stepwise multiple logistic regression analysis was done and adjusted odds ratio (AOR) was used to explore the real association.

RESULTS

A total of 226 female medical students of the College of Health Sciences, Addis Ababa University responded to the questionnaire. The distribution of the students that responded to the questionnaire is 22.1%, 17.2%, 18.6%, 21.7% and 20.4% for 1st, 2nd, 3rd, 4th, and 5th year students respectively.

The response rate was 91.5%. There was relatively similar distribution of number of medical students in each class year. The ages of the study participants ranged from 18 to 26 years, with mean age of 21.0 (SD 1.7) years. Majority (71%) were between the ages of 20 to 23 years followed by under the age of 20 years (23.4%). The mean height and weight of the study participants was 1.60 (SD 0.07) meters and 54.1(SD 8.1) kilograms respectively. One hundred and fifty (66.4%) had a normal BMI, 22.1% were underweight and the rest were overweight. There was no participant who was obese, that is BMI over 30 kg/m^2.

Menarche was between 13 and 15 years in 58.4% of the participants and less than 13 years of age in 35% of them. The usual menstrual cycle was ≥28 days (85.4%) and menstrual flow was not more than 7 study participants' parents were from Addis Ababa. The majority (85.4%) of the study participants' parents were married. Among the participants, 123 (54.4%) lived with their parents while 103(46.4%) lived in dormitories.

Among the participants, 191(84.5%) had at least one PMS symptom with their menstrual cycle. Participants having one of the physical symptoms (breast tenderness, headaches, muscle/joint pain, bloating, weight gain) with PMS were 155(68.6%). Psycho-behavioral symptoms experienced by the participants were fatigue/lack of energy 155(81.2%) followed by anger/irritability in 130(68.1%), decreased interest in home/dorm activities in 125 (65.4%), decreased interest in social activities in 122(63.9%) and difficulty of concentrating in 119 (62.3%). (Table 1)

Table 1: Premenstrual syndrome Symptoms among Female Medical Students, College of Health Sciences, Addis Ababa University, March 2019 (n=226).

Psycho-behavioral and physical symptoms	Mild No (%)	Moderate No (%)	Severe No (%)	Total No (%)
Anger/irritability	71(37.2)	47(24.6)	12(6.6)	130(68.1)
Anxiety/tension	68(35.6)	29(15.2)	9(4.7)	106(55.5)
Tear full/increased sensitivity to rejection	58(30.4)	23(12.0)	14(7.3)	95(49.7)
Depressed mood/hopelessness	65(34.0)	33(17.3)	13(6.8)	111(58.1)
Decreased interest in class activities	61(31.9)	38(19.9)	19(9.9)	118(61.8)
Decreased interest in home/dorm activities	73(38.2)	32(16.8)	20(10.5)	125(65.4)
Decreased activity in social activities	63(33.0)	42(22.0)	17(8.9)	122(63.9)
Difficulty concentrating	55(28.8)	47(24.6)	17(8.9)	119(62.3)
Fatigue/lack of energy	57(29.8)	64(33.5)	34(17.8)	155(81.2)
Overeating/food cravings	37(19.4)	35(18.3)	14(7.3)	86(45.0)
Insomnia	43(22.5)	12(6.3)	4(2.1)	59(30.9)
Hypersomnia (needing more sleep)	52(27.2)	34(17.8)	18(9.4)	104(54.5)
Feeling overwhelmed or out of control	52(27.2)	25(13.1)	13(6.8)	90(47.1)
Physical symptoms, breast tenderness, headaches muscle/joint pain, bloating, weight gain	45(23.6)	71(37.2)	39(20.4)	155(81.2)

One hundred and four (53.0%) of the participants reported academic performance impairment in their learning activities while the remaining reported that they did not have problem in that regard. Among those who reported performance impairment due to PMS, 67(29.6%) reported missing class lectures, seminars, bed sides or rounds, 11(4.8%) missed examination and 3(1.3%) of them reported withdrawal from their study.

A hundred and two (52.9%) participants reported impairment in their social life activities.

According to the Diagnostic and Statistical Manual of Mental Disorders, fifth edition, text revision diagnostic criteria for PMS/premenstrual dysphoric disorder (DSM V-TR), 129(57.1%) students fulfilled the diagnostic criteria for PMS (Table 2).

Table 2: Negative effects of premenstrual syndrome on academic and social performance of female medical students, college of health sciences, Addis Ababa University, March, 2019 (n=226).

Academic and social performance	Mild Number (%)	Moderate Number (%)	Severe Number (%)	Total Number (%)
Study and learning activities	51(26.3)	39(20.1)	14(7.2)	104(53.6)
Relationship with friends and classmates	58(29.9)	26(13.4)	4(2.1)	88(45.4)
Relationship with family	50(25.8)	22(11.3)	10(5.2)	82(42.3)
Social life activities	62(32.0)	29(14.9)	11(5.7)	102(52.6)
Home responsibilities	63(32.5)	32(16.5)	18(9.3)	113(58.3)

Under Pearson Chi-square test, the age of participants, the class year, the BMI and the age at menarche were significantly associated with the presence of PMS.

Multiple logistic regression analysis revealed that participants with BMI<18.5 kg/m^2 were three times more likely to develop PMS compared with healthy weight students with AOR =3.01, 95% CI (1.71-6.3) and p<0.05. Respondents whose ages at menarche were between 13 and 15 years were more likely to develop PMS compared with those 16-18 years with AOR =6.12, 95% CI (1.99-19.8) and *p*<0.05(Table 3).

Table 3: Association of demographic and gynecologic factors with premenstrual syndrome in female medical students, college health sciences, Addis Ababa University, March, 2019 (n=226)

Demographic and gynecologic characteristics	Symptoms		COR (95% CI)	AOR (95% CI)	P-value
	Yes (%)	No (%)			
Class year					
1st	37(74.0)	13(26.0)	1.00	1.00	
2nd	36(92.3)	3(7.7)	0.24(0.06-0.9)	0.29(0.7-1.2)	0.09
3rd	32(76.2)	10(23.8)	0.88(0.34-2.3)	1.12(0.4-3.1)	0.82
4th	46(93.9)	3(6.1)	0.19(0.05-0.7)	0.21(0.06-0.8)	0.26
5th	40(87.0)	6(13.0)	0.43(0.15-1.2)	0.47(0.15-1.4)	0.19
BMI(kg/m2)					
<18.5 (Underweight)	36(72.0)	14(28.0)	3.04(1.27-7.3)	3.01(1.71-6.3)*	0.02*
18.5 and 24.9 (Healthy	133(88.7)	17(11.3)	1.00	1.00	
weight)	22(84.6)	4(15.4)	1.42(0.37-5.10)	1.12(0.11-3.10)	0.55
25 to 30 (Overweight)					
Age at menarche (years)					
<13	68(86.1)	11(13.9)	5.41(1.41-21.2)	6.21(1.10-20.2)	0.40
13-15	115(87.1)	17(12.9)	5.92(1.66-21.8)	6.12(1.99-19.8)*	0.01*
16-18	8(53.3)	7(46.7)	1.00	1.00	
Interval between menstrual cycle	29(72.5)	11(27.5)	1.46(0.49-4.3)	1.84(0.56-5.9)	0.31
<28 days	135(88.8)	17(11.2)	0.48(0.18-1.3)	0.73(0.25-2.1)	0.55
28days	27(79.4)	7(20.6)	1.00	1.00	
>28 days					

*=p<0.05

DISCUSSION

This survey involved medical students aged 18–26 years, similar to previous studies in 2002 (28) and 2014 in Ethiopia (11), except that this study included only medical students. The prevalence of PMS in our study, based on DSM-V criteria, was 57.1%. This figure is markedly higher than previous two studies done in Mekelle University (11) and Jimma University (28), which reported prevalence of PMS based on DSM-IV to be 27% and 37% (but 83.2% when they defined PMS based on ACOG 2000 criteria for diagnosis of PMS) respectively, although the study done in Jimma University included both social and health sciences students and the study in Mekelle university included all health science students while this study recruited only medical students who are all the time in academic stress leading to the high prevalence of PMS.

Comparability between our study and those studies will be difficult because of the differences in the criteria used to diagnose PMS and the type of students they included in the studies (11,28). Neither PMS nor PMDD are reflected as official diagnoses by DSM-IV. PMDD appears as a "depressive disorder not otherwise specified" in the DSM-IV. The new DSM V changes would actually recognize PMDD as a disorder. Since almost all previous studies used the older version, DSM IV, comparisons were made with these studies.

The prevalence of PMS in our study is comparable with a research done on university students in Izmir, Turkey which reported the prevalence of PMS to be 58.1% (31). This study is also in agreement with the study done among female medical students of a medical college in Chennai, India showing prevalence of dysmenorrhea to be 51% and pre-menstrual syndrome of 67% (35).

The most commonly reported psycho- behavioral symptom experienced by the participants was fatigue/ lack of energy and around two-thirds of the students have at least one of the physical symptoms such as breast tenderness, headache, muscle/joint pain, bloating and/or weight gain. In the study done in Jimma University, decreased interest in the usual activities was the dominant psycho-behavioral symptom and easy fatigability being the commonest of the physical symptoms (28). In the study done in Mekelle University, the most commonly reported physical symptom with PMS was abdominal bloating and the commonly reported psycho- behavioral symptom experienced by the participants was loss of interest in doing things (11).

This highlights that physical or psycho-behavioral symptoms can be different among students but the extent to which students can be affected by these symptoms is significant.

In this study, nearly one-third of female medical students had performance impairment interfering with the daily school activities of the participants such as missing classes, seminars, bed-side teachings and rounds. This is almost similar with the study done in Mekelle university, Saudi Arabia and India (11, 28, 29). This shows the extent to which female students are affected by PMS even requiring them to miss the most important activities of the teaching-learning process as medical students. One should not also ignore the fact that there were even drop outs from medical school for the mere reason of having a severe PMS.

As multiple logistic regression analysis revealed, underweight participants were three times more likely to develop PMS than those with normal BMI (AOR =3.01, 95% CI (1.71-6.3) and $p<0.05$. This result agrees with the research done among Nigerian university students but there are studies which showed more PMS in obese participants (37, 38). Our study group does not have obese participants, making comparisons difficult. Students whose age at menarche was between 13 and 15 years were six times more likely to develop PMS compared to those whose menarche was at 16-18 years of age. This goes in line with the finding among Nigerian university students which showed significant association between PMS and young age at menarche (37).

There are multiple reasons that can be mentioned to justify the disparity of results on PMS among several studies. These reasons could range from differences in sample size and data collection techniques to the criteria used to define PMS.

Strength and limitations of the study:
This study used the most recent criteria (DSM-V) to diagnose PMS which makes it up to date with regard to methodology and interpretation of information on prevalence and characteristics of PMS. The sample size is adequate and the proportion of study participants is well distributed among the class years, which gives a better understanding of the possible differences between participants in each class year and their impact on PMS.

However, retrospective logging of symptoms is not the best way to collect data as it is prone to recall bias.

Although the topic is sensitive to Ethiopian culture, the fact that the participants were medical students and the questionnaire was self- administered makes it less liable to bias in this regard.

Conclusion and recommendations:

The prevalence of PMS, based on DSM-V criteria, is high among medical students of Addis Ababa University. Severe symptoms affected the social and academic performance of the students causing them to frequently miss classes and exams and in some cases to the level of withdrawal from their studies. Age at menarche and BMI affected the development of PMS among these students. Psycho-behavioral symptoms were more common than physical symptoms among AAU medical students.

This study showed PMS is an important deterrent to the performance of female medical students in College. Strategies to reduce PMS related wastage need to be considered by higher education institutes in Ethiopia.

A follow up in-depth look in to the problem from diverse perspectives and across different dimensions is highly recommended.

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Competing Interest:

The authors declare that this manuscript was approved by all authors in its current form and that no competing interest exists

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