Psychocentrum Review

Prevalence of premenstrual syndrome and premenstrual dysphoric disorder among college students and their association with lifestyle, socio-demographic factors and perceived stress level

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Original Article

Prevalence of Premenstrual Syndrome and Premenstrual Dysphoric Disorder Among College Students and Their Association with Lifestyle, Socio-demographic Factors and Perceived Stress level

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Abstract. Premenstrual dysphoric disorder (PMDD) is luteal phase disorder and characterized by variety of physical and psychological symptoms. A cross sectional study was carried out. Sample was drawn from students of medical, physiotherapy and nursing colleges attached to Dr. S N medical college, Jodhpur. Menstrual history, premenstrual symptom screening tool (Cronbach α=0.928) and Perceived stress scale was used estimate prevalence of premenstrual syndrome and premenstrual dysphoric disorder among college students and investigate relationship of them with lifestyle, socio demographic factors and perceived stress level. Prevalence of PMS is as similar in medical and allied health students of western Rajasthan as in other states from India and neighboring Asian countries. PMS is often associated with high perceived stress, onset from menarche, cramps and more demanding educational curriculum, number of menstrual days and cycle irregularity. The most common symptoms of PMS was anger/irritability, closely followed by fatigue/lack of energy (75.7%), decreased interest in work activities (74.5%) decreased interest in work activities (71.3%), difficulty. There was significant difference among the participants when perceived stress level was compared. The individuals with no PMS, moderate to severe PMS and PMDD differed significantly (p=0.000).

Introduction

Physical symptoms before and during menstruation are known as premenstrual symptoms and experienced by 80% of women during their reproductive years (Hylan, Sundell, & Judge, 1999). These symptoms are often mild in nature and do not interfere with functioning of women. Clinically significant physical and behavioral symptoms are experienced by 20-30% of women during reproductive years and termed as premenstrual syndrome (WHO, 1996). women during reproductive years and termed as premenstrual syndrome.[2] The behavioral symptoms predominantly include fatigue, irritability and labile mood and are severe enough to impair occupational, social or academic functioning of women.

Premenstrual dysphoric disorder (PMDD) is luteal phase disorder and characterized by variety of physical and psychological symptoms. Symptoms often start immediately after ovulation and increase in severity till the bleeding starts. Characteristically the severity is at

peak during first one or two days of menstruation and decrease thereafter (Bäckström et al., 2003). The duration of symptoms, timing of onset and severity can vary between different menstrual cycles in every woman (Pearlstein, Yonkers, Fayyad, & Gillespie, 2005). On prospective questioning, around 90% of women describe at least one or another physical or psychological symptoms presence around menstruation (Sveindóttir & Bäckström, 2000). However on basis of prospective symptom charting only 2-6% met criteria for PMDD as defined under the diagnostic and statistical manual of mental disorder 5th edition (DSM-5).

Little is known about the risk factors of PMS despite high prevalence and no universal treatment exists. Lifestyle factors are often assumed to be associated with severity of PMS and PMDD. Study by Shah and Christian (2020) diet was not significantly associated with severity of PMS but dietary practices such as dieting and too much junk food consumption were associated with menstrual symptoms. Caffeine intake was found association with PMS but not PMDD. Symptoms of PMS and PMDD were related with tobacco chewing and alcohol consumption. Conversely regular exercise including Yoga and Meditation has been associated with decreased severity of PMS and PMDD symptoms. A recent study from Nepal refuted the association of PMS and PMDD with socio-demographic factors (Badkur, Singh, Arjaria, & Wanjpe, 2023).

Psychological stress can be a significant factor on causation/severity of PMS and PMDD symptoms through activation of hypothalamic Pituitary Ovarian axis (Freeman & Halbreich, 1998). A bio cycle study has found association of high perceived stress in recent months with majority of physical and psychological symptoms of PMS and PMDD (Goldenberg et al, 2010). For those who had change in perceived stress from one cycle to another, more symptoms were reported during cycles preceded by higher stress level.

Influence on Daily Life

The prominent symptoms of PMDD significantly affect wellbeing and routine life of affected individuals. PMS affect college attending females more frequently as they are subjected to academic performance and various arena of daily life. Among college goers medical and nursing students are affected more adversely as medical curriculum demands high level of cognitive exercise, concentration and hands on life saving skills. The most common symptoms of PMDD revealed on retrospective studies include depressed mood, anxiousness, mood lability and tension (Severino, Freeman, & Gise, 1992; Erikkson, 1999). The impairment contributed by PMDD and quantity of disability adjusted life years (DALY) is of equal magnitude as major depressive disorder (Pearlstein et al., 2000; Halbreich, Borenstein, Pearlstein, & Kahn, 2003). Halbreich et al. (2003) estimated 3.8 years of disability due to PMDD in every affected woman during the reproductive years. Existing studies demonstrated the impact of PMDD can be more severe with relationship among family members rather than work and social functioning (Campbell, Peterkin, O'grady, & Sanson-Fisher, 1997; Frank, Dixon & Grosz, 1993; Kuczmierczyk, Labrum, & Johnson, 1992; Robinson, & Swindle, 2000). On controlling the time spent on work it was revealed that PMS and PMDD affected women had impaired work performance during the luteal phase of menstruation (Chawla, Swindle, Long, Kennedy, & Sternfeld, 2002). A community based study of 1045 women observed high impact of premenstrual symptoms on social, school and functional performance at work places in compare to home situations (Bäckström et al. 2003). In addition to this, women with PMDD often report cognitive symptoms in form of inattention, low concentration decreased memory subjectively (Man, MacMillan, Scott, & Young, 1999). Existing literature indicate increase rate of self-harming thoughts and suicidal attempts during most intense premenstrual symptoms (Baca-Garcia et al., 2004; Chaturvedi, Chandra, Gururaj, Pandian, & Beena, 1995; Wittchen, Becker, Lieb, & Krause, 2002).

Need for the Current Study

Despite the magnitude of problem, PMDD was often unrecognized (Pearlstein et al., 2000). Recent years witnessed shifting of focus to PMDD and related disorders by academicians, researchers, policy makers and scientific community at large. The available data indicate implication of serotonin abnormalities in causation of PMDD (Halbreich, 2003). Serotonin is attributed to PMDD because serotonergic medications exert anxiolytic and antidepressant effects and are the mainstay of treatment in management of PMDD (Marjoribanks, Brown, O'Brien, & Wyatt, 2013). Recently a neurobiological model of attenuated positive emotional processing and intensified negative emotional processing has been proposed in causation of PMDD (Protopopescu et al., 2008). The genetic factors are another area of interest as clustering of PMDD is observed in families (O'Brien, Rapkin, & Schmidt, (Eds.). 2007). Alike other major psychiatric disorders lifestyle factors are likely to be implicated in the origin of PMDD. It has been observed those lifestyle modifications such as reduced consumption of caffeine, salt, chocolate and refined sugars, increased daily moderate aerobic exercise and use of stress reduction techniques, and relaxation brings about symptomatic relief in PMDD symptoms and their severity (Freeman & Sondheimer, 2003).

For long, PMS has been considered a western culture-bound syndrome and was unrecognized in the developing countries. Cross-cultural studies and available data indicate pan global presence of PMS and PMDD (Chandra, 2001; American College of Obstetricians and Gynecologists, 2000). Even though PMDD is a biological phenomenon, socio-cultural factors seem to determine perception, explanation, handling, and even help seeking related to it (Chandra, 2001; Tschudin, Bertea, & Zemp, 2010). There is scant literature available on PMS/PMDD from low- and middle-income countries, including India. Recently different studies are reported with variable rates of PMDD and PMS from different states of India (Banerjee, Roy, & Takkar, 2000; Kamat, Nimbalkar, & Nimbalkar, 2012; Mishra, Banwari, & Yadav, 2015; Padhy, Sarkar, Beherre, Rathi, Panigrahi & Patil, 2015; Parikh, Parikh, & Parikh, 2015; Raval, Panchal, Tiwari, Vala, & Bhatt, 2016; Waghachavare, Chavan, & Dhumale, 2013). In addition to vide variation about prevalence of PMDD and PMS none of the available studies explored the association with perceived stress, which is important contributor in causation of PMDD and PMS. The objective of this preliminary work is to evaluate symptoms of PMS in Indian medical and nursing students and to find the association between lifestyle factors, socio-demographic factors and symptom severity. We also explored the association between symptom severity of PMDD and perceived stress to explore the etiology of disorder.

As in other medical disorders, this strategy was based on the hope that improved understanding of the disorder will help in devising the preventive and treatment strategies for the disorder. Improvements in the way clinicians think about these disorders are sure to ultimately have their effects on patients.

Method

The aim of this study was to estimate prevalence of premenstrual syndrome and premenstrual dysphoric disorder among college students and investigate relationship of them with lifestyle, socio demographic factors and perceived stress level.

Based on the existing literature we formulated following *hypothesis:*

"*The perceived stress level is positively correlated with premenstrual symptoms and premenstrual dysphoric disorder.*" The PMS and PMDD are attributed to the socio-demographic and lifestyle factors.

To test the hypothesis following objectives were formulated

1   To evaluate prevalence of premenstrual syndrome and premenstrual dysphoric disorder among college students.

2   To study common premenstrual symptoms among college students and their association with lifestyle and socio-demographic factors.
3   To understand relationship between perceived stress and severity of premenstrual symptoms.

Participants

Selection Criteria for subjects
1. Age 18 to 45 years
2. Female sex
3. Literate enough to read and understand consent form & questionnaires in English language
4. Having regular menstrual cycles (21-35 days) for six menstrual cycles
5. No active hormonal contraceptive use
6. Not using any drugs including anxiolytics, diuretics, hormones and neuroleptics
7. Abstinence from all forms of substance abuse during preceding six months
8. No medical or psychiatric illness
9. Willingness to give informed consent

Ethical consideration: Research review board & ethical committee of the institution approved Study. An informed consent was obtained from the subject prior to participation in the study.

Study Design

A cross sectional study was carried out. Sample was drawn from students of medical, physiotherapy and nursing colleges attached to Dr. S N medical college and affiliated hospitals, Jodhpur.

All female students fulfilling the inclusion criteria for the study were invited to participate in the study. Students were approached in their classes with announcement about the purpose of study. Firstly the concept of premenstrual symptom followed by details of tools for the study was explained. During the process of study 578 students were approached for study. 52 of them refused to give informed consent and dropped at level of recruitment. On application of selection criteria 46 of them did not meet the selection criteria thus making the sample size of 480. After receiving the informed consent semi structured performa was provided to consenting medical, physiotherapy, occupational therapy and nursing students. The semi structured Performa included socio demographic details, lifestyle factors, menstrual history, premenstrual symptom screening tool and perceived stress scale (Cohen, Kamarck, & Mermelstein, 1994). Only 420 students returned the completed performa and 16 were incomplete in one or another aspect thus making the final sample size of 404.

The study included students who were enrolled in the medical, nursing, physiotherapy, occupational therapy and postgraduate courses. Those subjects who satisfied the all the inclusion criteria were recruited for the study. The subject's socio-demographic data was recorded. After that each participant in the study was subjected to menstrual history performa, premenstrual symptom screening tool (PSST) (Steiner, Macdougall, & Brown, 2003) and perceived stress scale (Cohen et al., 1994).

After assessment of subjects the descriptive data was calculated in respect of age, body mass index, locality, religion, marital status, course enrolled, family income, smoking, participation in games, and exercise and food choice of participants. The descriptive data was also analyzed about menstrual history such as age of menarche, length of menstrual cycles, days of menstrual bleeding, premenstrual symptoms duration, years with premenstrual symptoms, regularity of menstrual cycles at menarche and current date, menstrual cramps, use of hormonal

contraception, family history of premenstrual symptoms and timing of premenstrual symptom onset. The prevalence of all fourteen symptoms listed under the PSST (Steiner et al., 2003) was determined with severity of impairment in all four domains. Subjects were also rated according to PSST and were categorized in three categories namely no PMS, moderate to severe PMS and PMDD. The score of perceived stress was calculated according the guiding principles of scale (Cohen et al., 1994) use and subjects were categorized in low perceived stress, moderate perceived stress and severe perceived stress. Results were drawn and discussed in light of existing literature.

Statistical Analysis

The statistical analyses were done in 3 phases with the help of software 'SPSS 23. First, descriptive statistics of all socio-demographic, menstrual factors and premenstrual symptoms was calculated including range, mean, standard deviation, and percentage. Following this no PMS, moderate to severe PMS and PMDD groups were compared with application of analyses of covariance (ANCOVAs) in respect to all socio-demographic, lifestyle, menstrual factors in addition to premenstrual symptoms (Jamieson, 2004). Following this correlation coefficient (Taylor, 1990) was calculated between degree of premenstrual symptoms and score on perceived stress scale.

Results

Table 1: Distribution of age, height, weight, and body mass index

Variable	Number (n)	Minimum	Maximum	Mean	Standard deviation
Age (years)	404	18	33	20.89	2.57
Height (cm)	404	140	178	159.4	6.709
Weight (Kg)	404	35	85	53.33	8.956
Body Mass Index	404	14	35	21	3.29

Majority of our sample comprised of young females with average age of 20 years as shown in table 1. On analysis of Body Mass Index it was revealed that only 65% of the students were within recommended BMI range and 23% were underweight (BMI<18.5) and 10 % were overweight (BMI>25). Among the overweight subjects only 10 % comprised of obese (BMI>30) (n=5).

Table 2: Distribution of locality, religion, marital status, education

Variable					
Locality (%)	Urban (58.2)	Rural (21.8)	Town(20)		

Religion (%)	Hindu (93.6)	Muslim (3.2)	Christian (1.0)	Others (2.1)	
Marital Status (%)	Married (6.4)	Unmarried (93.3)	Divorced/ separated (0.2)		
Course enrolled (%)	Medical (59.7)	Nursing (30.9)	Physiotherapy (3.0)	Occupational therapy (1.7)	Post-graduation (4.7)

Table 3: Description of lifestyle factors

Variable			
Tobacco use (n)	Yes (2)	No (402)	
Regular exercise(n)	Yes (119)	No (285)	
Games Participation (n)	Yes (65)	No (339)	
Weight Loss	Yes (48)	No (356)	
Food choice(n)	Spicy Fatty (180)	Salty (52)	Other (172)

Only two of the participants reported regular use of tobacco and any form of substance in past six months. In contrary to perceived belief about fitness of healthcare students, only 30 percent of them reported some form of exercise (n=119) and just half of exercising students reported participation in sports activities (n=65). Majority of students denied any form of participation in exercise (n=285) and games (n=339). Continuing with games and exercise participation, only 12% of students reported any weight loss over the last six months. Nearly half of the total participants (n=180) reported spicy and fatty food choice while the remaining half reported food consumption of average quality, neither rich in calories nor in salt content (Table 3).

Table 4 a: Description of menstrual cycle and PMS related factors

	Number (n)	Minimum	Maximum	Mean	St. deviation
Age of Menarche (years)	404	10	19	13.54	1.357
Number of Menstrual Days	404	1	10	4.67	1.226
Length of Menstrual Cycle	404	18	50	29.64	3.761
Number of PMS days	373	1	10	2.67	1.646
Number of PMS Years	373	1	18	5.78	3.079

Mean age of menarche was 13.5 years. Almost 75 % of selected sample attained menarche between 12-14 years of age. The majority of selected sample had menstruation for 3-5 days (n=315) with average duration of 4.6 days. Average duration of menstrual cycle was 29.6 days and around 70 % of participants reported regular menstrual cycle of 28-30 days (n=280). Only

31 subjects reported no discomfort during or before menstruation but majority of them had some discomfort lasting from 1-3 days. Only 20% of selected sample reported premenstrual symptoms lasting for four days or more (Table 4 a). Almost all the subjects with PMS had the discomfort since menarche (n=363/373). Around three fourths (n=298) of selected sample reported cycle regularity at menarche which was increased over the years. At the time of interview 85% of selected sample had regular menstrual cycle (n=344). Experience of cramps was common among the studied subjects. Three fourth of selected sample (n=300) experienced noticeable cramps during menstruation. Only 15 subjects had children and 43 subjects were using Birth Control pills at the time of enrolment in the study. Family history of PMS was present in only 30 % of subjects while the majority (n=281) reported no active PMS symptoms among the first degree relatives of studied subjects (Table 4 b).

Table 4 b: Description of menstrual cycle and PMS related factors

Variable	Yes	No
Cycle regularity at menarche (n) %	(298) 73.8	(106) 26.2%
Cycle regularity in last six months (n) %	(344) 85	(60) 14.9%
Cramps (n) %	(300) 74.3	104 (25.7%)
Use of Birth Control pills (n) %	(43) 10.6	(361) 89.4
Family History of PMS (n) %	(123) 30.4	(281) 69.6
Children (n) %	(15) 3.6	(389) 96.4

Enrolled students and PMS and PSS

Despite the common presence of varied premenstrual symptoms, around two third of subjects (n=267) did not meet DSM-5 criteria for premenstrual disorder (APA, 2013) on screening though premenstrual symptom screening tool. Around 30% (n=120) of subjects had moderate to severe premenstrual disorder, marginally missing the DSM-5 criteria and only 17 (4.2%) subjects fulfilled the criteria for premenstrual dysphoric disorder. The prevalence of premenstrual disorder and premenstrual dysphoric disorder represented in below pie chart (Figure 1).

Figure 6: Prevalence of Premenstrual syndrome and premenstrual dysphoric disorder
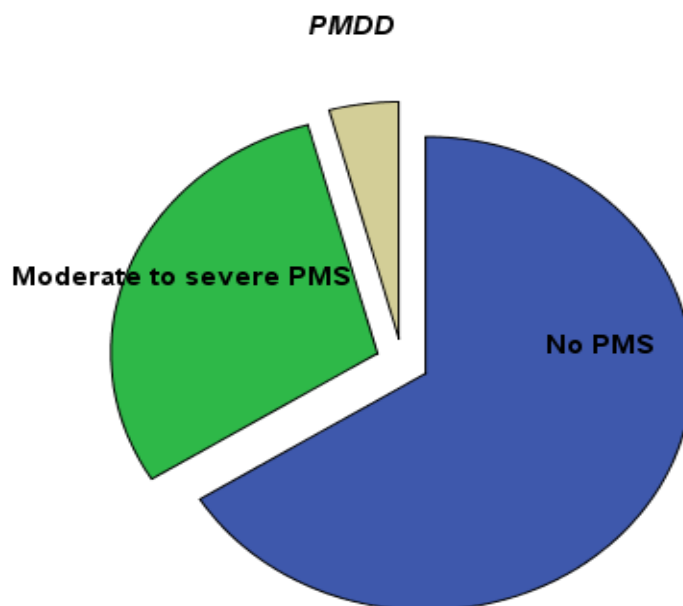
The participants with premenstrual dysphoric disorder, moderate to severe PMS and no PMS exhibited no group differences in regard to age, Body Mass Index, locality, faith practiced and marital status although significant difference was observed when they were compared in regard to education (p=0.03). Medical students exhibited significantly high prevalence of PMS and PMDD in compare to other groups. In regard to life style factors no difference was observed between the groups in regard to food choice, games played involvement with sports and abuse of substances.

Table 5 Characteristics of participants according to severity of PMS symptoms.

	No/Mild PMS (n=267)	Moderate to severe PMS (n=120)	PMDD (n=17)	P
Mean age (SD)	21.01(2.71)	20.76(2.37)	19.82(1.66)	0.151
BMI	21.00(3.19)	20.88(3.39)	21.33(4.12)	0.851
Menarche	13.57(1.37)	13.48(1.36)	13.47(13.54)	0.815
Menstrual Days	4.58(1.19)	4.79(1.87)	5.29(1.72)	0.032
Cycle length	29.59(3.46)	29.79(4.41)	29.35(3.35)	0.845
PMS days	2.31(1.63)	2.81(1.51)	2.58(2.31)	0.02
PSS score	15.92(4.36)	20.81(4.98)	27.82(7.23)	0.00

The participants with PMS and PMDD reported significantly more number of menstrual days (p=0.032) and cycle irregularity at the menarche (p=0.000) and at the time of interview (p=0.019) in compare to individuals with no PMS. Participants demonstrated no group difference in regard to age of menarche, use of birth control pills, family history of PMS, and length of menstrual cycle. Individuals with PMS and PMDD and no PMS differed significantly in regard to duration of premenstrual symptoms (p=0.02). PMDD and moderate to severe PMS subjects had longer duration of discomfort than the individuals without PMS. Presence of cramps before or during menstruation was significantly more prevalent among the affected subjects (p=0.003). Cramps were most frequent among the subjects with PMDD followed by moderate to severe PMS.

There was significant difference among the participants when perceived stress level was compared. The individuals with no PMS, moderate to severe PMS and PMDD differed significantly (p=0.000). On computation of correlation coefficient there was moderately positive correlation between the perceived stress level and severity of premenstrual symptoms (correlation coefficient=0.541). While controlling various demographic and menstruation related factors the correlation coefficient still remained moderately positive between the severity of premenstrual symptoms and perceived stress level.

On the testing of perceived stress it was reveled that students overrepresented moderate stress (>75%) bracket. Only 18% of selected subjects had mild stress and 7% had high stress.

Table 6: Perceived stress level and correlation with premenstrual symptoms

PSST	Mean perceived stress	N	Standard Deviation	Correlation coefficient
No PMS	15.9288	267	4.36908	

Moderate to severe PMS	20.81	120	4.98735	
PMDD	27.82	17	7.23909	
All participants	17.88	404	5.5940	0.541

PSST -Premenstrual symptoms screening tool

The most commonly reported premenstrual symptom among the selected sample was moderate to severe anger/irritability (78 % {n=317}) followed by fatigue/lack of energy (75.7%), decreased interest in work activities (74.5% {n=301}) decreased interest in work activities (71.3%{n=288}), difficulty concentrating (69.8%) and anxiety/tension (69.3%). PMS and PMDD groups reported anger/irritability as one of the symptoms experienced during the menstruation or before menstruation. Loss of work and home related activity was reported as most troublesome symptom by the participants (Table 7).

Total 278 (79%) of participants reported functional impairment in at least one tested domain of functioning. Most frequent functional impairment lied with school/work life productivity (64%) followed by social life activities (60.9%). Relationship with family members was least affected domain where less than half of the participants (48%) reported some form of impairment of any given severity including mild, moderate and severe. Majority of affected participants reported mild level of functional impairment in any affected domain while only 1.2 % in each category reported severe impact on the affected domain due to premenstrual symptoms.

Table 7: Interference of premenstrual symptoms on various aspect of life

Life aspect	Total Prevalence %(n)	Mild impact %(n)	Moderate Impact %(n)	Severe Impact % (n)
School/ Work efficiency or productivity	64.1(259)	50.7(205)	12.1(49)	1.2(5)
Relationship with friends, classmates and coworkers	55(222)	37.9(153)	15.8(64)	1.2(5)
Relationship with family members	48.5(196)	36.4(147)	10.9(44)	1.2(5)
Social Life activities	60.9(246)	46.8(189)	12.1(49)	2.0(8)
Home responsibities	55.9(226)	39.4(159)	15.3(62)	1.2(5)

According to ICD-10 (WHO, 1993) 93.7 % of participants (n=378) who experienced at least one premenstrual symptom during last three months were identified as suffering from premenstrual tension syndrome. Only 6% of the participants denied any premenstrual symptoms of any given severity over the last three months.

Discussion

The sample of the current study is in line with previous studies of similar nature in India and elsewhere. As in past the mean age of participants was 20.89 ± 2.57 years and majority of them unmarried and came from urban background. The participants from other studies were also were young college students of urban background and unmarried (Bakhshani, Mousavi, & Khodabandeh, 2009; Banerjee et al., 2000; Issa, Yussuf, Olatinwo, & Ighodalo, 2010; Singh, Kumar, Kaur, Swami, Soni, Shah, & Singh, 2015; Tabassum, Afridi, Aman, Tabassum, & Durrani, 2005).

According to DSM-5 PMDD criteria the prevalence of PMS was 33% in our sample (29.7 % for moderate to severe PMS and 4.2% for PMDD) among the college going medical and allied health students. In compare to other studies in this age group our results demonstrated slightly higher prevalence of PMS although our study results were close to study results of Thai nurses which exhibited prevalence of PMS around 25% (Chayachinda, Rattanachaiyanont, Phattharayuttawat, & Kooptiwoot, 2008). Rapkin and Mikacich (2008) and similar Asian studies (Bakhshani et al., 2009; Nisar, Zehra, Haider, Munir, & Sohoo, 2008; Nourjah, 2008; Tabassum et al., 2005) among college students demonstrated prevalence of PMS in range of 8.3-23%. The higher prevalence of PMS in our study can be attributed to socio cultural factors and background of students as medical and allied health course students are generally less stigmatized about health conditions including PMS in compare to students who had little or no contact with health related subjects. Banarjee et al., (2000) reported 6.4% prevalence of PMDD among Indian women which was slightly higher than our study results. Although higher prevalence of PMDD in Banarjee study can be explained on the basis of small sample size (n=62), prospective nature of study and higher age of participants in compare to our study.

Study results showed no relation with age although study by Raval et al., (2016) and Masho, Adela, & Paul (2005) demonstrated association of younger age with PMDD rather than old age. Few of the other studies demonstrated association of older age with higher prevalence and severity of PMS (Brahmbhatt, Sattigeri, Shah, Kumar, & Parikh, 2013; Kamat et al., 2012; Merinkagas et al., 1993; Sheehan et al., 1998). Absence of association between age and severity of PMS in our study can be attributed to the fact that recruited sample was homogenous and most of the study participants belonged to same age group.

Our study results showed no association of PMS/PMDD prevalence with religion and confirmed the similar data from other studies in India (Raval et al., 2016; Shenuka, Vijayalakshmi, & Kumar, 2018). Our study results concurred with Raval et al. (2016) and Kamat et al. (2012) which showed prevalence of PMDD 3.7% and 4.7% respectively much closer to our results of 4.2%. However the prevalence of moderate to severe PMS was almost double (14.7% Vs 30%) in compare to Raval et al., (2016) but was much closer to Singh et al., (2015) study from Jaipur, India.

Only 6% of study participants showed no PMS symptoms during or before menstruation which was very close to 6-14% by most other Indian studies (Joshi, Pandey, Galvankar, & Gogate, 2010; Kamat et al., 2012; Pady et al., 2015; Raval et al., 2016; Singh et al., 2015; Waghachavare et al., 2013).

Alike other Indian studies the most frequently observed symptoms included anger/irritability (78.% {n=317}) followed by fatigue/lack of energy (75.7%), decreased interest in work activities (74.5% {n=301}) decreased interest in home activities (71.3%{n=288}), difficulty concentrating (69.8%) and anxiety/tension (69.3%). Alike Raval et al (2016), fatigue/Lack of energy and decreased interest in work featured among the most commonly observed symptoms

of PMS. Although in contrast to above study anger/irritability was most commonly observed symptoms of PMS which featured as third most commonly observed symptom in the Bhavnagar, India study. In regard to prevalence of most common PMS symptoms similar observations were made by Bakshani et al ., 2009; Nourjah, 2008, Tabassum etal.,2005; Nisar et al., 2008; and Pearlstein et al., 2005).

More than three fourth of subjects reported some form of impairment in any of the studied domain. School/work life productivity was most affected domain (64%) followed by social life activities (60.9%). The study results concur with Raval et al (2016) and Steiner et al. (2003) which showed that almost three fourth of affected subjects reported interference of social life activities with friends, family members, classmates during or before menstruation among the affected subjects.

Alike other Indian studies group with PMS, PMDD and no PMS showed no group differences according to Body Mass Index. Study by Bansal, Goyal, Yadav & Singh (2012), Lentz (2007) and Raval et al. (2016) demonstrated association of higher BMI with moderate to severe PMS and PMDD which was not exhibited in our study. This could be attributed to homogenous sample of young students in our study and underrepresentation of obese subjects (n=5)

Our study demonstrated association of PMS, PMDD with number of menstrual days (p=0.032). Individuals with longer duration of menstrual cycle had higher chances of meeting criteria for PMS and PMDD. The study results are in contrast with Steiner & Born (2000), Issa et al. (2010) and Rawal et al. (2016) which showed no association with duration of menstrual cycle and chances of meeting criteria for PMS and PMDD. However our study results are in line with studies conducted across borders (Hylan et al., 1999).

As per our study results individuals with moderate to severe PMS and PMDD had more years with one or another premenstrual symptoms than individuals with no PMS group. The study result were statistically significant and underlies the fact than PMS/PMDD is often chronic disorder with relapsing and remitting course and often sets it base with onset of menarche. Study by Steiner & Born, 2000 and Raval et. al., 2016 demonstrated that individuals with PMS and PMDD experienced more number of days with premenstrual symptoms during each cycle than individuals with no PMS group and same was replicated in our study.

Results from our study demonstrated association of crams with PMS/PMDD. The study results replicate the results of multiple other studies (Chayachinda et al., 2008; Kamat et al., 2012; Steiner, Peer, Palova, Freeman, Macdougall, & Soares, 2011; Issa et al., 2010; Nisar et al., 2008; Steiner, et al., 2003.). In addition to cramps students with PMS and PMDD reported increased severity of multiple other symptoms such as depression, irritability, fatigue and lowered interest in work and other activities. The presence of multiple psychological symptoms underlies the influence of physical symptoms on the psychological symptoms.

There was no association established between the positive family history of PMS and PMDD and chances of meeting DSM-V criteria for PMS and PMDD in our study. The study results were in contrast with existing literature (Nisar et al., 2008; Nourjah, 2008; Singh et al., 2015) and established the fact that alike other psychiatric disorders there is multi-factorial causation model for PMS and PMDD. It could be argued that high stress could be the sole factor for development of PMS and PMDD among the studied young students. It can also attributed to the fact that mothers avoid discussing their problems with young children since discussion of menstruation related factors and sexuality is considered taboo in large section of Indian community particularly western Rajasthan.

The observation of this study affirmed previous studies results that there is little association between physical activity and participation in games and development of PMS and PMDD. The effect of exercise on premenstrual symptoms appears anecdotal (Daley, 2009; Vishnupriya, & Rajarajeswaram, 2011). Despite the fact that individuals with PMS and PMDD often advised to engage in physical activities and games as this seems to relieve some symptoms of PMS and PMDD (Vigod, Ross, & Steiner, 2009). The existing literature reveals that high intensity aerobic

exercise is superior to low intensity aerobic exercises for PMS sufferers (Lentz, 2007). The studies also reveal that physical symptoms were less common among the exercising participant which was conformed in our study. Considering conflicting nature of existing data the association between exercise and PMS symptoms needs further deliberation with larger study.

There was strong association between the perceived stress level and severity of premenstrual symptoms. Subjects meeting criteria for PMDD had higher perceived stress with medium level of correlation (0.541) even after controlling other factors.

Pre menstrual screening tool is highly sensitive instrument in diagnosis of PMDD (sensitivity 90.9%). It can be reasonably established that yield of screening tool for PMDD is high as negative predictive value of PSST is above 97%. This can be argued that individuals found no PMDD on PSST unlikely to meet criteria for PMDD on other forms of assessment including structured interview. Those diagnosed PMDD with use of PSST need further exploration as predictive value of positive PSST is relatively low (28.98%). The high prevalence of PMS and PMDD in can be attributed to high false positives with use of PSST.

The use of PSST (Steiner et al., 2003) for detection of prevalence of PMS and PMDD is not without limits. The instrument was not enough to diagnose/exclude individuals with major depressive disorder, panic disorder, anxiety disorder, dysthymic disorder and personality disorder which often have overlap with PMDD and PMS symptoms.

The study was also limited by including highly selective sample of medical and allied health students. The symptoms were reported on basis of last two menstrual cycles thus adding the chances of recall bias. Since we have not adopted daily charting of symptoms the study results largely represent possible diagnosis of PMDD and PMS rather than the confirmed diagnosis. To add another limitation PSST was not sufficient to differentiate between no PMS and mild PMS as there were no established criteria in this regard.

Conclusion

Prevalence of PMS is as similar in medical and allied health students of western Rajasthan as in other states from India and neighboring Asian countries. PMS is often associated with high perceived stress, onset from menarche, cramps and more demanding educational curriculum, number of menstrual days and cycle irregularity. The most common symptoms of PMS was anger/irritability, closely followed by fatigue/lack of energy (75.7%), decreased interest in work activities (74.5%) decreased interest in work activities (71.3%), difficulty.

Limitations

1. Sample size being small, results could not be generalized.
2. We cannot be sure whether this is a representative sample of Indian women as sample was withdrawn from medical college and affiliated hospitals
3. Subjects could have responded defensively due to fear of detection of possible psychiatric phenomena.
4. Possibility of anxiety, depression and other neurotic disorder affecting results could not be ruled out.
5. Retrospective nature of study could have affected results due to recall bias

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