Epidemiology and Related Potential Risk Factors of Premenstrual Syndrome in Females in Pakistan: Cross Sectional Study With Nested Case-Control Study

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Abstract

Premenstrual syndrome (PMS) risk factors affected daily life activities and life style. This study assessed the epidemiology and related potential risk factor of PMS in females.422 participants from the general Gujrat population were chosen for a cross-sectional study with nested case-control study using the logistic regression and convenient sampling techniques. 4 groups of females in the general population, ranging in age from 15-49, were created. PMS symptoms, risk factors, and their effects on daily life activities were measured using a self-structured questionnaire and Performa.The findings indicated that 206 women (48.8%) had PMS, and that symptoms were more common in 15–22year old females (40.52%) and less severe as people get older. PMS was more common in participants with a high body mass index (2.33 times) than in those with lower levels of anxiety (4.412 times), hypertension (2.34 times), diabetes (10 times), hyperlipidemia (1.17 times), familial history (1.127 times) and physical trauma (1.176 times), as well as in those who consume junk food (1.86 times), sweet foods (1.195 times), carbonated beverages (1.38 times) frequently, and excessive amounts of tea/coffee (1 times). This study found that younger aged females had the highest prevalence of PMS. Age-related reductions in premenstrual symptoms were also revealed by this research. PMS was more prevalent among those with risk factors, such as greater BMI, anxiety, hypertension, diabetes, hyperlipidemia, nutritional factors, family history, or physical trauma.

Key words: Diabetes, Epidemiology, Hyperlipidemia, Hypertension, Premenstrual syndrome, Risk factors

Introduction

PMS is a cyclical condition that affects both teenage and adult females. It is defined by emotional, psychological, and physical symptoms that occur only during the menstrual cycle's luteal phase. Lifestyle, physical activity, and food choices can all affect the severity of PMS symptoms. As a result, physical activity has been recommended as a non-pharmacological treatment for reducing the severity of PMS symptoms. Aerobic exercise may help with PMS tiredness and sadness, according to the American College of Obstetricians and Gynecologists (ACOG). Research shows that regular exercise can help with PMS symptoms (Haghighi, Jahromi, & Daryano Osh, 2015).

University of California, San Diego, each of the three previous cycles had somatic and affective symptoms five days before menstruation: Depression, angry outbursts, irritability, anxiety, confusion, and social withdrawal are affective symptoms. Breast tenderness, abdominal bloating, headache, and extremity swelling are examples of somatic symptoms. From days 4 to 13 of the menstrual cycle, these affective and somatic symptoms were relieved (Dickerson, Mazyck, & Hunter, 2003). PMS and affective illnesses like anxiety, panic disorder, severe depression, and seasonal affective disorder share some characteristics and are sometimes linked. More than half of women with PMS, for example, have a history of anxiety or mood issues (Halbreich, 2003).

Regular exercise or habitual activity, as well as diet, can affect body composition. Body composition is gauged by the BMI. According to numerous studies, BMI levels are greater in PMS-affected women. There is no connection between BMI and PMS, according to some research, but not others (Haghighi et al., 2015). PMS and PMDD are serious issues that affect teenagers more than adults. There has been research into the relationship between PMS and diet, such as calcium intake, caffeine-containing drinks, chocolate, or refined sugar desserts (Tadakawa, Takeda, Monma, Koga, & Yaegashi, 2016).

We discovered that research on the epidemiology of premenstrual syndrome is scarce. To the best of our knowledge, no studies have ever been conducted that explicitly investigate the potential risk factors associated with PMS. As a result, this study will fill a gap in the literature

by determining the epidemiology and related potential risk factors for premenstrual syndrome in females.

The present study was aimed to assess the epidemiology of female premenstrual syndrome and associated potential risk factors. Potential risk factors (active smoking, anxiety, diabetes, hypertension, family history, junk foods, cold drinks, carbonated water, excessive tea/ coffee intake, physical trauma, emotional/ psychological trauma, history of malnutrition, history of hormonal imbalance, hyperlipidemia, disturb sleep pattern) were associated to PMS, according to the null hypothesis, while according to the alternative hypothesis they weren't associated.

Methodology

Study design

Population based cross sectional study with nested case-control study was planned. This study was approved by the ethical committee of the institute and informed consent was obtained from the participants. Data was collected from general population of Gujrat city according to WHO. Participants of the study were women (aged 15-49 years). Potential risk factors and PMS were variables in this study. The study size was informed by a convenience sample (n=422) (Rezende et al., 2022).

Data sources/measurement

A cross-sectional study with 422 females was conducted. Data was collected from Gujrat city. Females aged 15-49 years were included. In this study, PMS symptoms and risk factors were assessed using a self-structured questionnaire and Performa. The questionnaire's variability was good (Cronbach's a=0.619). All of the questionnaire's questions were briefly explained to the patients. The score ranges were (0-11) mild, (12-21) moderate, and (23-33) severe. The higher the score, the greater the participants' risk of PMS. A measuring tape and a weight machine were used for measurement. The data was gathered in accordance with the rules and regulations of the University of Lahore's ethical committee.

Bias

The bias that results from convenience sampling is that some population members are less likely than others to be included. The study excluded women with psychiatric conditions, those taking contraceptives or other hormone-altering drugs, those who were pregnant, and those who had irregular menstrual cycles.

Statistical analysis

The data was entered and analyzed using the statistical package for social sciences (SPSS) software version 25. For quantitative variables, mean and standard deviation were calculated, whereas frequency and percentages were calculated for qualitative variables. A suitable statistical test was used for inferential statistics. All results were calculated at a 95% confidence interval, and a P-value ≤ 0.05 was considered significant.

Results and Findings

The demographic characteristics of participants have been shown in Table 1. PMS diagnostic questionnaire was divided into three groups. 1st group was Mild with 217(51.4%) patients. 2nd group was Moderate with 165(39.1%) patients. And Severe was 3rd group with 40(9.5%) patients. Age had been divided into 4 groups, 1st group that is from age 15-22 contain 171 patients i.e. 40.5 of overall, 2nd group ranges from people of age 23-31 and had 112(26.5%) patients, 3rd group been 32-39 years old having 75(17.8%) participants,4th group been 40-49 years old having 64 (15.2) patients. 3rd demographic in this table is about occupation of patients divided into 4 groups including 235(55.7%) students, 19(4.5%) teachers, 150(35.5%) house wives, and 18(4.3%) doctors. BMI is calculated by using formula kg/m² and has been divided into 4 categories as, underweight patients having BMI <18.5, there were 46(10.9) patients in this group, normal weight patients having BMI in between 18.5 and 24.9, there were 272(64.5%) patients in this this group. Overweight patients having BMI between 25 to 29.9 fall in group 2 and had 78(18.5) patients while 26(6.2) patients were in group 3 that were obese with BMI >30.0.

The prevalence of premenstrual syndrome has been shown in Figure 1. Out of 422 patients, 48.82% were observed with prevalence of premenstrual syndrome.

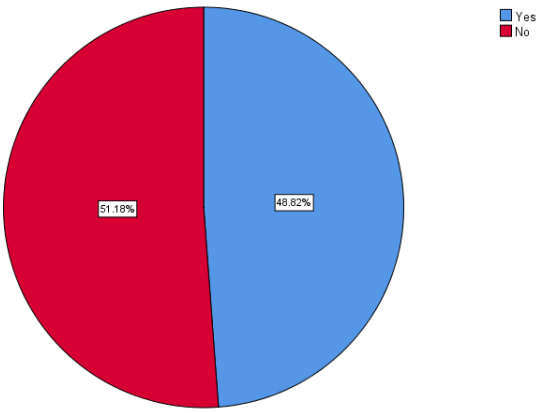

Figure 1: The prevalence of premenstrual syndrome

Table 1: Demographics of study participants

Demographic data		n (%)
Premenstrual syndrome diagnostic questionnaire	Mild	217(51.4)
	Moderate	165(39.1)
	Severe	40(9.5)
	Total	**422(100.0)**
Age Group in Years	15-22	171(40.5)
	23-31	112(26.5)
	32-39	75(17.8)
	40-49	64(15.2)
	Total	**422(100.0)**
Occupation	Student	235(55.7)
	Teacher	19(4.5)
	House wife	150(35.5)
	Doctor	18(4.3)
	Total	**422(100.0)**
Health Status	Underweight	46(10.9)
	Normal	272(64.5)
	Overweight	78(18.5)
	Obese	26(6.2)
	Total	**422(100.0)**

Table 2 presents the association of prevalence of PMS vs risk factors. Table shows scoring of prevalence of premenstrual syndrome that was Anxiety 197(46.7%), Diabetes 25(5.90%), Hypertension 88(20.09%), Family history 90(21.30%), Sweet food 231(54.70%), Junk food 287(68.00%), Cold drinks 269(63.70%), Carbonated water 145(34.40%), Excessive coffee/tea intake 152(36.00%), Physical trauma 34(91.90%), Emotional/psychological trauma 105(24.90%), History of malnutrition 48(11.40%), History of hormonal imbalance 88(20.90%), Hyperlipidemia

31(7.30%), Disturb sleep pattern 197(46.70%), Health status [Underweight 46(10.90%), Normal 272(64.50%), Overweight 78(18.50%), Obese 26(6.20%)] out of 422(100%). And Chi-square value, P-value, Odds Ratios, Lower and upper limit of risk factors among participants. Anxiety (51.697[a]), Diabetes (6.549[a]), Hypertension(7.007[a]), Family history (4.646[a]), Sweet food (2.005[a]), Junk food (7.255[a]), Cold drinks (.296[a]), Carbonated water (2.547[a]), Excessive tea/coffee intake (.421[a]), Physical trauma (.739[a]), Emotional/psychological trauma (19.781[a]), History of malnutrition (14.862[a]), History of hormonal imbalance (25.444[a]), Hyperlipidemia (1.367[a]), Disturb sleep pattern (18.165[a]), Health status (5.656[a]) are Chi-square values of risk factors vs prevalence of PMS. Significance values (p-value) of all risk factors vs prevalence of PMS are Anxiety (0), Diabetes (0.001), Hypertension (0.008), Family history (0.031), Sweet food (0.157), Junk food (0.007), Cold drinks (0.586), Carbonated water (0.111), Excessive tea/coffee intake

Table 2: The scoring of prevalence of premenstrual syndrome, Chi-square value, P-value, Odds Ratios, Lower and upper limit of risk factors among participants

			Prevalence of Premenstrual syndrome		Total					
			Yes	No		Chi-Square	P value	Odds Ratio	Lower Limit	Upper Limit
Anxiety		Yes	133 (64.6%)	64 (29.6%)	197 (46.7%)	51.697[a]	0	4.327	2.876	6.51
		No	73(35.40%)	152(70.40%)	225(53.30%)					
	Total		206(100%)	216(100. %)	422(100%)					
Diabetes		Yes	6(2.90%)	19(8.80%)	25(5.90%)	6.549[a]	0.01	0.311	0.122	0.795
		No	200(97.10%)	197(91.20%)	397(94.10%)					
	Total		206(100%)	216(100%)	422(100%)					
Hypertension		Yes	54(26.20%)	34(15.70%)	88(20.90%)	7.007[a]	0.008	1.902	1.177	3.074
		No	152(73.80%)	182(84.30%)	334(79.10%)					
	Total		206(100%)	216(100%)	422(100%)					
Family history		Yes	53(25.70%)	37(17.10%)	90(21.30%)	4.646[a]	0.031	1.676	1.045	2.687

		No	153(74.30%)	179(82.90%)	332(78.70%)					
	Total		206(100%)	216(100%)	422(100%)					
Sweet food		Yes	120(58.30%)	111(51.40%)	231(54.70%)	2.005[a]	0.157	1.32	0.899	1.939
		No	86(41.70%)	105(48.60%)	191(45.30%)					
	Total		206(100%)	216(100%)	422(100%)					
Junk food		Yes	153(74.30%)	134(62.00%)	287(68.00%)	7.255[a]	0.007	1.767	1.165	2.678
		No	53(25.70%)	82(38.00%)	135(32.00%)					
	Total		206(100%)	216(100%)	422(100%)					
Cold drinks		Yes	134(65.00%)	135(62.50%)	269(63.70%)	.296[a]	0.586	1.117	0.75	1.661
		No	72(35.00%)	81(37.50%)	153(36.30%)					
	Total		206(100%)	216(100%)	422(100%)					
Carbonated water		Yes	63(30.60%)	82(38.00%)	145(34.40%)	2.547[a]	0.111	0.72	0.481	1.079
		No	143(69.40%)	134(62.00%)	277(65.60%)					
	Total		206(100%)	216(100%)	422(100%)					
Excessive tea/coffee intake (caffeine)		Yes	71(34.50%)	81(37.50%)	152(36.00%)	.421[a]	0.516	0.877	0.589	1.305
		No	135(65.50%)	135(62.50%)	270(64.00%)					
	Total		206(100%)	216(100%)	422(100%)					
Physical trauma		Yes	19(9.20%)	15(6.90%)	34(8.10%)	.739[a]	0.39	1.361	0.672	2.757
		No	187(90.80%)	201(93.10%)	388(91.90%)					
	Total		206(100%)	216(100%)	422(100%)					
Emotional trauma/psychological trauma		Yes	71(34.50%)	34(15.70%)	105(24.90%)	19.781[a]	0	2.815	1.768	4.484
		No	135(65.50%)	182(84.30%)	317(75.10%)					
	Total		206(100%)	216(100%)	422(100%)					

History of malnutrition (nutritional disorders)	Yes	36(17.50%)	12(5.60%)	48(11.40%)	14.862[a]	0	3.6	1.816	7.137
	No	170(82.50%)	204(94.40%)	374(88.60%)					
Total		206(100%)	216(100%)	422(100%)					
History of hormonal imbalance	Yes	64(31.10%)	24(11.10%)	88(20.90%)	25.444[a]	0	3.606	2.15	6.046
	No	142(68.90%)	192(88.90%)	334(79.10%)					
Total		206(100%)	216(100%)	422(100%)					
Hyperlipidemia	Yes	12(5.80%)	19(8.80%)	31(7.30%)	1.367[a]	0.242	0.641	0.303	1.357
	No	194(94.20%)	197(91.20%)	391(92.70%)					
Total		206(100%)	216(100%)	422(100%)					
Disturb sleep pattern	Yes	118(57.30%)	79(36.60%)	197(46.70%)	18.165[a]	0	2.325	1.573	3.438
	No	88(42.70%)	137(63.40%)	225(53.30%)					
Total		206(100%)	216(100%)	422(100%)					
Health Status	Under-weight	24(11.70%)	22(10.20%)	46(10.90%)	5.656[a]	0.13			
	Normal	138(67.00%)	134(62.00%)	272(64.50%)					
	Over-weight	29(14.10%)	49(22.70%)	78(18.50%)					
	Obese	15(7.30%)	11(5.10%)	26(6.20%)					
Total		206(100%)	216(100%)	422(100%)					

(0.516), Physical trauma (0.39), Emotional/ psychological trauma (0), History of malnutrition (0), History of hormonal imbalance (0), Hyperlipidemia (0.242), Disturb sleep pattern (0), Health status (0.13). Odds ratios are Anxiety (4.327), Diabetes (0.311), Hypertension (1.902), Family history (1.676), Sweet food (0.157), Junk food (1.32), Cold drinks (1767), Carbonated water (0.72), Excessive tea/coffee intake (0.877), Physical trauma (1.361), Emotional/ psychological trauma (2.815), History of malnutrition (3.6), History of hormonal imbalance (3.606), Hyperlipidemia (0.641), and Disturb sleep pattern (2.325). Lower and

Upper limits are Anxiety 2.876 and 6.51, Diabetes 0.122 and 0.795, Hypertension 1.177 and 3.074, Family history 1.045 and 2.687, Sweet food 0.899 and 1.939, Junk food 1.165 and 2.678, Cold drinks 0.75 and 1.661, Carbonated water 0.481 and 1.079, Excessive tea/coffee intake 0.589 and 1.305, Physical trauma 0.672 and 2.757, Emotional/ psychological trauma 1.768 and 4.484, History of malnutrition 1.816 and 7.137, History of hormonal imbalance 2.15 and 6.046, Hyperlipidemia 0.303 and 1.357, and Disturb sleep pattern 1.537 and 3.438. The findings of our study show that symptoms associated with premenstrual syndrome persist until menopause but decrease with age (Figure 2). Figure 2 shows distribution of Age groups in years among participants in which out of total 422 individuals, highest percentage of participants was in age group 15-22 which was 171 (40.52%) while the lowest percentage of participants was in age group of 40-49 i.e. 64 (15.17%).

The results of risk factors show that participants with a high BMI were 2.33 times more likely to have premenstrual syndrome than those with a normal BMI. Participants with anxiety were 4.412 times, participants with hypertension were 2.34 time, participants with diabetes were 10 times, participants with hyperlipidemia were 1.17 times and nutritional factor (junk foods 1.86 times, sweet foods 1.185, carbonated water 1.38 times, excessive tea/ coffee 1 times) more likely to experience premenstrual syndrome. Premenstrual syndrome risk factors also include family history 1.127 times and physical trauma 1.176 times (Table 3).

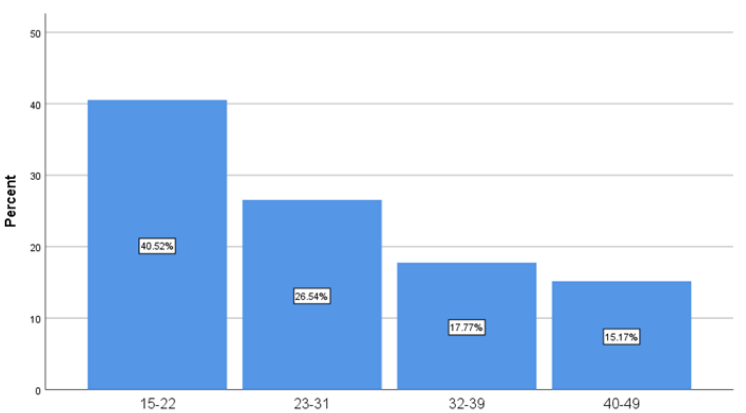

Figure 2: The age groups in years

Table 3: The prevalence and frequency (percentage) of the risk factors of premenstrual syndrome.

Risk Factors		n (%)
Prevalence of Premenstrual syndrome	Yes	206(48.8)
	No	216(51.2)
	Total	422(100.0)
Marital Status	Married	167(39.6)
	Unmarried	255(60.4)
	Total	422(100.0)
Anxiety	Yes	197(46.7)
	No	225(53.3)
	Total	422(100.0)
Diabetes	Yes	25(5.9)
	No	397(34.1)
	Total	422(100.0)
Hypertension	Yes	88(20.9)
	No	334(79.1)
	Total	422(100.0)
Family history	Yes	90(21.3)
	No	332(78.7)
	Total	422(100.0)
Sweet food	Yes	231(54.7)
	No	191(45.3)
	Total	422(100.0)
Junk food	Yes	287(68.0)
	No	135(32.0)
	Total	422(100.0)
Cold drinks	Yes	269(63.7)
	No	153(36.3)
	Total	422(100.0)
Carbonated water	Yes	145(34.4)
	No	277(65.6)
	Total	422(100.0)
Excessive tea/coffee intake (caffeine)	Yes	152(36.0)
	No	270(64.0)
	Total	422(100.0)
Physical trauma	Yes	34(8.1)
	No	388(91.9)
	Total	422(100.0)
Emotional trauma/psychological trauma	Yes	105(24.9)
	No	317(75.1)
	Total	422(100.0)
History of malnutrition (nutritional disorders)	Yes	48(11.4)
	No	374(88.6)
	Total	422(100.0)
History of hormonal imbalance	Yes	88(20.9)
	No	334(79.1)
	Total	422(100.0)
Hyperlipidemia	Yes	31(7.3)

	No	391(92.7)
	Total	422(100.0)
Disturb sleep pattern	Yes	197(46.7)
	No	225(53.3)
	Total	422(100.0)

Table 3 shows the prevalence and frequency (percentage) of the risk factors of premenstrual syndrome. Patients with prevalence of PMS were 206(48.8%), Married patients were 167(39.6%), Unmarried patients were 255(60.4%), Anxiety patients were 197(46.7%), Diabetic patients were 25(5.9%), Patients with Hypertension were 88(20.9%), Patients have family history were 90(21.3%), with sweet food were 231(54.7%), with junk food were287(68.0%), with cold drinks were 269(63.7%), with carbonated water were 145(34.4%), with excessive intake of tea/coffee were 152(36.0%), with physical trauma were 34(8.1%). 105(24.9%) were patients with emotional trauma/ psychological trauma. 48(11.4%) patients have history of malnutrition, 88(20.9%) patients have history of hormonal imbalance. Hyperlipidemic patients were 31(7.3%), and patients with disturb sleep pattern were 197(46.7%).

Discussion

It is acknowledged that PMS is a medical illness that affects women's physical, emotional, and social wellbeing, particularly throughout puberty and the start of menstruation.(Zendehdel & Elyasi, 2018) The current study's objective was to assess the epidemiology and associated possible risk factors of female premenstrual syndrome. A cross-sectional study involving 270 participants who ranged in age from 20 to 25 was previously been out. The sample size for the current study is 422, with ages ranging from 15 to 49. According to a previous study's findings, women between the ages of 20 and 22 have a higher prevalence of PMS (31.1%) than women of other ages. According to the current study's findings, women between the ages of 15 and 22 had a greater prevalence (40.52%) of PMS symptoms.(Baker & Lee, 2018) The study population may be the cause of the disparity in the prevalence rates. In the last study, female medical students served as the sample pool, but in the current study, we drew participants from the general Gujrat population. In the present study, out of 422 respondents 206 (48.8%) females reported about premenstrual symptoms among general population of Gujrat.

The results of this study support prior research indicating participants with high BMI were 2.33 times more likely to experience premenstrual

syndrome than those with a normal BMI. In a previous study, 500 university students were used as the sample size, but in this one, we used a sample of 422 persons drawn from the general Gujrat population. A cross-sectional study with a sample size of 221 teenage females between the ages of 13 and 15 was previously carried out. According to this study, teenagers who experience anxiety are more likely to experience PMS.(Armini, Zahriya, Hidayati, & Dewi, 2022) The severity of PMS symptoms will increase with anxiety level. Our study's findings support a previous study that showed participants with anxiety were 4.412 times more likely than other participants to experience premenstrual syndrome.

In the past, a prospective study with a sample size of 116,686 US women aged 25 to 42 years was carried out. According to this study, women under the age of 40 have the most positive link between PMS and a higher risk of hypertension.(Bertone-Johnson, Whitcomb, Rich-Edwards, Hankinson, & Manson, 2015) Our study's findings corroborate those of a previous study, which found that participants with hypertension were 2.34 times more likely than non-hypertensive participants to experience premenstrual syndrome. A retrospective cohort research with a sample size of 1 million females aged 20 to 50 years was previously carried out. This study found that young female patients with DM had an elevated risk of PMS. This study was the first to examine how DM-related PMS occurrences affect adolescent females.(Huang et al., 2022) Our study's findings support a previous study that found premenstrual syndrome was 10 times more prevalent in persons with diabetes than in the general population.

A study with a sample size of 1699 females was previously undertaken. According to this study, higher cholesterol levels and a family history of dyslipidemia are linked to PMS. Additionally, PMS may be influenced by nutritional and metabolic factors.(Cheng et al., 2013) According to the findings of our study, premenstrual syndrome was 1.17 times more common in participants with hyperlipidemia and nutritional factors (junk food 1.86 times, sweet foods 1.185 times, cold drinks 1.21 times, carbonated water 1.38 times, excessive tea/coffee 1 times) than in non-hyperlipidemic participants.

Limitations of the study

1. There was not psychiatric clinical diagnosis used in this study for underlying psychic symptoms.
2. The participants of the study were not prospectively followed up.

Suggestions

1. Different diagnostic tools along with clinical diagnosis of premenstrual syndrome can be used to investigate more accurate results.
2. Management of PMS with dietary intake and physical activities are recommended.
3. Keep a daily symptoms diary to help identify PMS which Include details of menstrual cycle.
4. Life style changes should also be recommended which include exercise for at least three times a week. There must be a proper counseling and awareness about PMS appropriate medical treatment and psychotherapy services should be provided to affected female students.

Conclusion

This study concluded that the prevalence of PMS was higher in the 15- 22-year-old female age group (40.52%). This study also discovered that premenstrual symptoms decrease with age. Participants with premenstrual syndrome were more likely to have higher BMI, anxiety, hypertension, diabetes, hyperlipidemia, nutritional factors, family history, or physical trauma than others.

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