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PREVALENCE AND SEVERITY OF PREMENSTRUAL SYNDROME AMONG FEMALE UNIVERSITY STUDENTS IN SAUDI ARABIA: A CROSS-SECTIONAL STUDY.

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Abstract

Background: Premenstrual syndrome (PMS) is a frequent disorder that affects women of reproductive age. It is defined by a variety of symptoms that manifest during the luteal phase of the menstrual cycle, which can be physical, emotional, or behavioral. The everyday activities, academic performance, and general quality of life can all be severely impacted by these symptoms. Although PMS is very common, little information is known about how it affects female university students, who have stressors and lifestyle factors. For creating efficient support systems and interventions, it is essential to comprehend the prevalence and severity of PMS in this population. This study aim to determine the prevalence, severity and factors influencing premenstrual syndrome and premenstrual dysphoric disorder among female university students in the Kingdom of Saudi Arabia.
Methods: This is an observational cross-sectional study that used a self-administered questionnaire and was completed anonymously by at least 384 female university students aged 18 to 25 from around Saudi Arabia. The data collection tool for this study is a self-administered questionnaire adapted from a relevant study conducted in Saudi Arabia.
Results: The study on the prevalence and severity of Premenstrual Syndrome (PMS) among 600 female university students in Saudi Arabia revealed notable findings regarding their menstrual health and associated symptoms. A majority of participants experience menarche between ages 10 and 12, and most report regular menstrual cycles of 28-30 days, with an average duration of 4-6 days and moderate menstrual flow. However, premenstrual symptoms are widespread, particularly mood swings (87.3%) and fatigue (69.0%). Severity analysis showed that a significant portion of participants

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(52.3%) experience severe mood swings, with considerable rates of severe fatigue (40.7%) and symptoms of anxiety and depression (31.0% d 27.7%, respectively). Additionally, premenstrual dysphoric disorder (PMDD) symptoms affect 90% of respondents, with many reporting emotional instability and physical discomfort. Risk factors indicate that a majority engage in unhealthy dietary habits and insufficient physical activity, which could heighten PMDD symptoms. While PMS symptoms correlate significantly with menstrual cycle regularity, no significant relationships are observed with age or other sociodemographic factors.
Conclusion: The study highlights the significant prevalence and severity of premenstrual syndrome and premenstrual dysphoric disorder among female university students in Saudi Arabia. With 90% of participants reporting PMDD symptoms and the majority experiencing severe mood swings and fatigue, it is evident that PMS has a substantial impact on their psychological well-being and daily functioning. Furthermore, our findings indicate that unhealthy lifestyle factors may exacerbate PMS symptoms, emphasizing the need for increased awareness and proactive management of this condition.

Keywords: Premenstrual syndrome, premenstrual dysphoric disorder, Prevalence, Severity, Female University Students, Saudi Arabia, Women's Health, Menstrual Cycle, Hormonal Fluctuations.

Introduction:
Premenstrual syndrome (PMS), additionally referred to as premenstrual stress, is described as a complex of Mental, emotional, physical, and behavioral sign [1]. Among women worldwide, PMS is a very common yet un underappreciated problem. Women experience it at different intensities, from mild to severe [2]. It begins during the luteal phase of the menstrual cycle and disappear at or within a couple of days following the beginning of the menstruation [3]. PMS typically affects fertile women aged 20-40 who may have a family history of the condition. Symptoms such as acne, weariness, soreness in breasts or mastalgia, bloating, anxiety and mood swings often last six days and terminate with menstruation, followed by a symptom-free phase [4]. Frank clinically defined PMS as "Premenstrual Tension" for the first time in 1931. Greene and Dalton coined the name "Premenstrual Syndrome" in 1953 to demonstrate that it includes symptoms other than emotional stress [5]. Globally, premenstrual syndrome (PMS) affects 20-32% of premenopausal and 30-40% of reproductive-age women [6]. Associated with poor physical health, increased healthcare utilization, and reduced quality of life, PMS can also impair psychosocial functioning [7]. Women with PMS may experience lifetime, concurrent, or premenstrual exacerbation of comorbid psychological or medical conditions [8].
A 2019 descriptive-correlational study revealed that PMS symptoms varied in severity, with 37% of participants reporting mild symptoms, 49.8% moderate, and 13.2% severe. The study found a significant correlation ($p<0.01$) between symptom severity and psychological well-being, explaining 11% of the variance in well-being [9]. A cross-sectional study at Maulana Azad Medical College in 2019 examined PMS in obstetrics and gynecology patients, revealing that younger participants tended to report more severe symptoms, particularly difficulties in focusing and irritability [10]. A study at Princess Nourah bint Abdulrahman University in 2020 identified a
47.1% prevalence of PMS, with 10% experiencing severe symptoms. Over 60% of participants reported some form of functional impairment, affecting academic and home responsibilities [11]. Another research at King Faisal University in 2021 highlighted a 23.3% prevalence of PMS, with 11.2% experiencing moderate symptoms and 12.5% severe to extremely severe symptoms classified as PMDD [12]. At Tabuk University, a study found a 57.26% prevalence of PMS, with 31.6% of cases being mild to moderate and 25.6% severe. PMDD had a prevalence rate of 57.3% among the

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participants [13]. Lastly, a 2022 study among university students in Central Uganda reported that 28.3% had PMS, with 76.9% experiencing at least one symptom [14]. The symptoms of PMS can cause financial ramifications, a reduction in social interactions, and missed work. The academic performance of female students may be negatively impacted by more severe cases of PMS. Because the frequency and severity of PMS among Saudi Arabian university students are still poorly understood, a thorough investigation is required. This is why we conducted a study with university students to gain an overview of the prevalence and severity of PMS among female students in KSA and its related factors.

Objectives:
The main purpose of this study is to determine the prevalence, severity and factors influencing premenstrual syndrome and premenstrual dysphoric disorder among female university students in the Kingdom of Saudi Arabia. An additional objective of this research is to assess the impact of PMS on academic performance and daily activities. And to investigate potential risk factors for PMS prevalence and severity.

Methodology:

Study Design and Setting:
The current observational cross-sectional study evaluated the prevalence and severity of PMS in the Kingdom of Saudi Arabia (KSA) among female university students between July to December 2024.

Subject: Participants, recruitment and sampling procedure:
Female university students aged 18-25 from various academic disciplines and years of study in the Kingdom of Saudi Arabia were recruited using social media platforms (such as Twitter, Snapchat, Instagram, WhatsApp, Facebook, etc.) and in-class announcements, with participation limited to an online survey. A representative sample was guaranteed by stratified random sampling.

Sample size:
The sample size was calculated by Raosoft with a confidence level of 95% and 5% margin of error, the minimum sample size was 384.

Inclusion and Exclusion Criteria:
The study's inclusion criteria include all female university students in Saudi Arabia who meet the age range of 18 to 25 and who are willing to participate in the research by providing informed consent. Additionally, the participants must have a regular menstrual cycle with normal bleeding duration. This study excluded participants who were pregnant, breastfed within the previous three months, had abnormal uterine bleeding, were taking psychopharmacological medications (e.g., antidepressants), used oral contraceptives or hormonal therapy, had already graduated, or refused to participate.

Method for data collection and instrument:
The data collection tool for this study is a self-administered questionnaire adapted from a relevant study conducted in Saudi Arabia [13]. Additional questions were developed and integrated based on a literature review of studies with similar objectives and methodologies.
The questionnaire, available in both Arabic and English to reach a broader population, begins with a

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brief description of the study and a consent question. The final version consists of 27 questions divided into five sections: sociodemographic information (age, academic level, weight, height), menstrual history (cycle characteristics including length, regularity, duration), PMS symptoms, severity, and timing (rating severity of symptoms such as anxiety, irritability, mood swings, increased appetite, headache, fatigue, depression, insomnia, fluid retention, weight gain, breast tenderness, abdominal bloating on a scale from 1 to 3), premenstrual dysphoric disorder (PMDD) symptoms (yes/no questions assessing mood fluctuations, sadness, hopelessness, irritability, anxiety, lack of interest in activities, difficulty concentrating, lethargy, overeating, sleep disturbances, feeling overwhelmed, and physical symptoms), and risk factors for PMS and PMDD (smoking, family history, contraception, dietary, and physical habits). The questionnaire aims to identify the prevalence and severity of PMS in Saudi Arabia by considering various factors.

Pilot test:
The questionnaire was given to 20 individuals who were asked to fill it out. This was conducted to evaluate the questionnaire's simplicity and the study's feasibility. Data from the pilot study was not included in the final results of the study.

Analyzes and entry method:
The data collection process began with Microsoft Office Excel (2021), where the information was organized and entered. After compilation, the dataset was exported to the Statistical Package of Social Science Software (SPSS) application, version 21 (IBM SPSS Statistics for Microsoft Windows, Version 21.0.) for in-depth statistical analysis. This involved ensuring compatibility during the transfer and applying various statistical tests and models to meet the research objectives.

Results:

Table (1) displays various demographic parameters of the participants with a total number of (600). The sociodemographic characteristics of the study participants, which comprise a sample size of 600 individuals, provide a comprehensive overview of the population's diversity and highlights pertinent trends within the data. The mean age of the participants is 21.8 years, with a significant proportion (approximately 57%) aged between 20 to 22 years, indicating a relatively young demographic that may influence various study outcomes. In terms of height, individuals primarily range from 160 to 165 cm, while weight data shows that a notable 34% of participants exceed 60 kg, suggesting a tendency towards heavier body weights within this group. Nationally, the overwhelming majority (95.3%) of participants identify as Saudi, which emphasizes the cultural context of the findings. Additionally, social status reveals that a vast majority (89.7%) are single, which may give insights into lifestyle choices or health behaviors. The educational level indicates a distributed enrollment across university years, with one-third of participants in their sixth year, potentially reflecting a population invested in higher education.

Table (1): Sociodemographic characteristics of participants (n=600)

Parameter		***No.***	***Percent (%)***
Age	less than 20 years	118	19.7
(Mean: 21.8, STD:2.3)	20 to 22	224	37.3

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	23 years old	150	25.0
	more than 23 years	108	18.0
Height (Mean: 158.8, STD:6.1)	less than 155 cm	142	23.7
	155 to 159 cm	184	30.7
	160 to 165 cm	202	33.7
	more than 165 cm	72	12.0
Weight (Mean: 58.3, STD: 14.7)	less than 50 kg	176	29.3
	50 to 55 kg	122	20.3
	56 to 60 kg	98	16.3
	more than 60 kg	204	34.0
Nationality	Non-Saudi	28	4.7
	Saudi	572	95.3
Where do you live?	Al Baha Province	2	.3
	Aseer Province	6	1.0
	Eastern Province	300	50.0
	Ha'il Province	2	.3
	Jizan Province	4	.7
	Madinah Province	20	3.3
	Makkah Province	132	22.0
	Najran Province	4	.7
	Qassim Province	2	.3
	Riyadh province	44	7.3
	Tabuk Province	84	14.0
Social status	Single	538	89.7
	Married	62	10.3
What is your educational level?	University, 1st year	68	11.3
	University, 2nd year	94	15.7
	University, 3rd year	72	12.0
	University, 4th year	62	10.3
	University, 5th year	104	17.3
	University, 6th year	200	33.3
Ranking GPA	Fair	10	1.7
	Good	227	37.8
	Excellent	363	60.5

As shown in figure 1, The data presented on physical exercise engagement reveals notable trends in the population's activity levels. A significant portion, 184 individuals, or 34.5%, reported never engaging in physical exercise, highlighting a concerning trend of inactivity. Meanwhile, 194 respondents, constituting 36.5%, described their activity level as rarely exercising, indicating that over one-third of the population participates in physical activity less than once a week. In contrast, 136 participants, or 25.5%, engage in exercise occasionally, while a mere 78 individuals, representing 14.5%, exercise regularly three to five times a week. Notably, only 8 participants, accounting for 1.5%, maintain a daily exercise routine.

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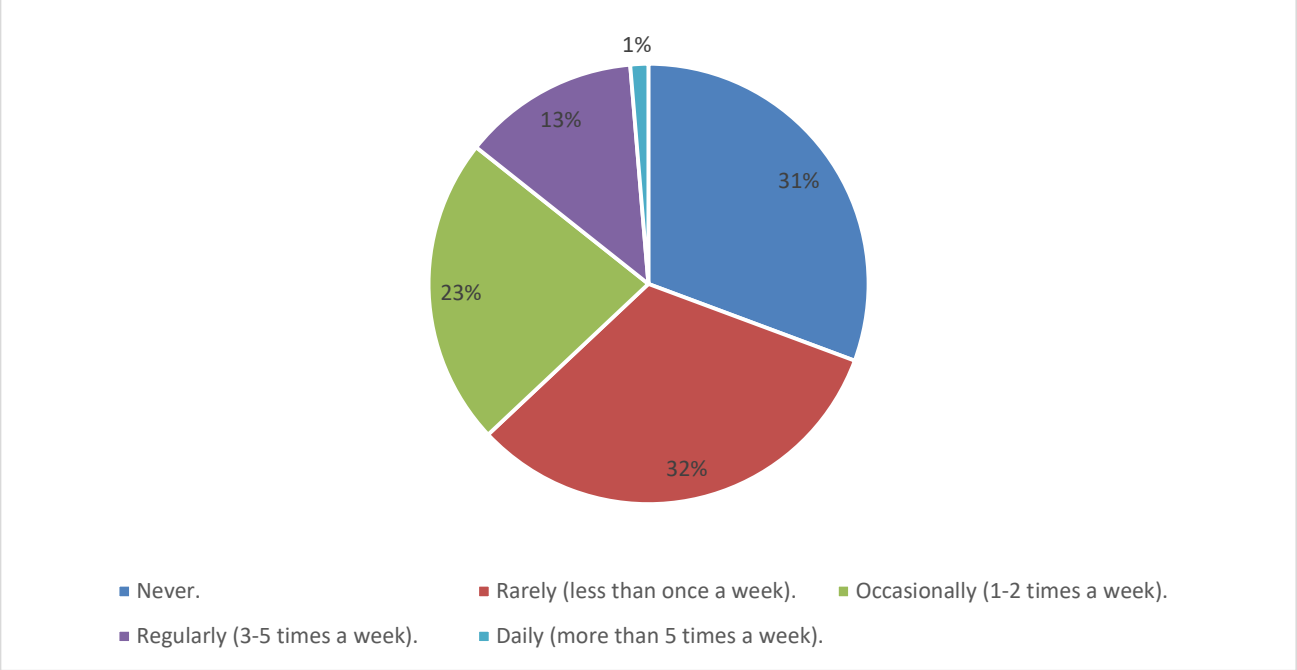
Figure (1): Illustrates rate of physical exercise among participants.



As illustrated in table (2), The data provides valuable insights into various parameters associated with the menstrual histories of 600 participants. The age of menarche is notably distributed, with a significant majority (47.7%) experiencing menarche between the ages of 10 and 12 years, suggesting a trend towards earlier onset, while only 4.0% began menstruating under the age of 10. Furthermore, menstrual cycle regularity shows strong consistency, with 74.0% of respondents reporting a regulated cycle of 28-30 days, indicating a generally healthy reproductive pattern among the majority. The average menstrual duration predominantly falls within the 4-6 days range (67.0%), aligning with typical menstrual health standards. Intensity of menstrual flow is primarily moderate in 78.3% of cases, reflecting common experiences among menstruators. The prevalence of premenstrual symptoms is striking, particularly mood swings (87.3%) and fatigue (69.0%), which highlight the multifaceted emotional and physical challenges faced by individuals during their menstrual cycles.

Table (2): Parameters related to menstrual history section (n=600).

Parameter		***No.***	***Percent (%)***
Age of menarche	Under 10 years	24	4.0
	10-12 years	286	47.7
	13-15 years	248	41.3
	Above 15 years	42	7.0
Menstrual cycle regularity	Regular (every 28-30 days)	444	74.0
	Irregular	156	26.0

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Average Duration of Menstrual Period	1-3 days	36	6.0
	4-6 days	402	67.0
	7-9 days	154	25.7
	More than 10 days	8	1.3
Menstrual Flow Intensity	Light	52	8.7
	Moderate	470	78.3
	Heavy	78	13.0
Do you experience any of the following symptoms before your period? (Check all that apply) *	Bloating	368	61.3
	Breast tenderness	342	57.0
	Weight Gain	188	31.3
	Headaches	238	39.6
	Mood swings	524	87.3
	Anxiety	286	47.6
	Depression	314	52.3
	Irritability	184	30.7
	Fatigue	414	69.0
	Insomnia	216	36.0
	Increased appetite	334	55.7

Results may overlap

As shown in figure (2), The data presented reveals insightful perspectives on the onset of symptoms prior to menstruation among respondents. Notably, 246 individuals, accounting for approximately 43.5%, reported that their symptoms typically begin 1-3 days before their period. This group represents the majority, indicating a short interval for symptom emergence. Following closely, 284 participants, or about 49.8%, indicated that their symptoms start between 4-7 days before menstruation, suggesting a significant number experience a longer premenstrual phase. In contrast, a smaller portion, with 60 respondents (approximately 10.5%), noted symptom onset between 8-14 days, while a mere 10 individuals, or 1.8%, reported symptoms beginning more than 14 days in advance.

Figure (2): Illustrates when does PMS usually start among participants.

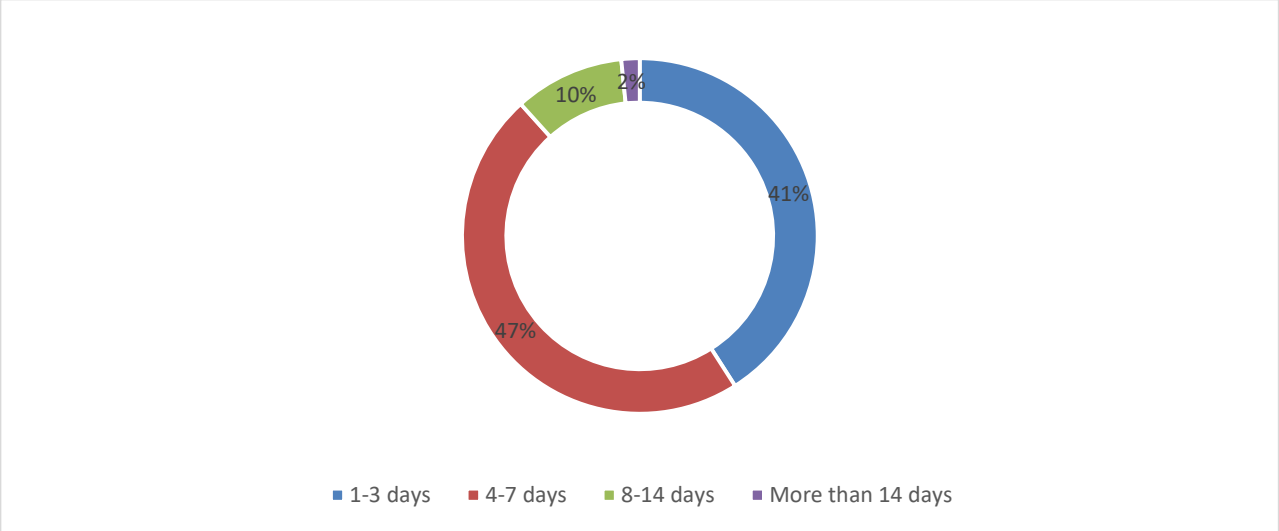

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Table (3) elucidates the varying severities of premenstrual syndrome (PMS) symptoms among 600 participants, revealing significant insights into the prevalence and impact of these symptoms. Notably, bloating affects 19.0% of individuals mildly, while a substantial 43.7% experience moderate severity, indicating that this symptom is quite common. Breast tenderness similarly demonstrates a significant presence, with 20.0% reporting mild and 36.3% moderate discomfort. Of particular concern, mood swings stand out, as 52.3% of participants report severe symptoms, highlighting a critical area for intervention. Fatigue, another prevalent symptom, is noted to be severe in 40.7% of cases, while anxiety and depression symptoms are also markedly experienced, with severe cases at 31.0% and 27.7%, respectively.

Table (3): Participants' symptoms of PMS severity (n=600).

Parameter	*Mild*	*Moderate*	*Severe*	*Non*
Bloating	114 19.0%	262 43.7%	82 13.7%	142 23.7%
Breast tenderness	120 20.0%	218 36.3%	114 19.0%	148 24.7%
Weight Gain	196 32.7%	156 26.0%	40 6.7%	208 34.7%
Headaches	152 25.3%	188 31.3%	90 15.0%	170 28.3%
Mood swings	62 10.3%	182 30.3%	314 52.3%	42 7.0%
Anxiety	106 17.7%	196 32.7%	186 31.0%	112 18.7%
Depression	120 20.0%	172 28.7%	166 27.7%	142 23.7%
Irritability	128 21.3%	134 22.3%	114 19.0%	224 37.3%
Fatigue	68 11.3%	212 35.3%	244 40.7%	76 12.7%
Insomnia	138 23.0%	158 26.3%	96 16.0%	208 34.7%
Increased appetite	110 18.3%	186 31.0%	162 27.0%	142 23.7%

The data presented in Table 4 provides significant insights into the prevalence and nature of symptoms associated with premenstrual dysphoric disorder (PMDD) among the 600 participants surveyed. Notably, 47.3% of participants reported that their symptoms typically begin 4-7 days before their period, while a smaller fraction experienced symptoms starting 1-3 days (41.0%) or more than a week in advance (11.7% collectively for 8-14 days and over 14 days). Alarmingly, 90% of respondents confirmed the presence of mood fluctuations, sadness, irritability, and anxiety before menstruation. This emotional instability is echoed in the findings that 67% lack interest in activities they typically enjoy, while 56% struggle with concentration. Furthermore, the physical manifestations of PMDD are vividly

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illustrated, with 81% reporting increased fatigue, 71.3% indulging in cravings, and 83.7% experiencing common-symptoms-such-as-breast-tenderness.

Table (4): participants' symptoms of premenstrual dysphoric disorder (n=600).

Parameter		***No.***	***Percent (%)***
How many days before your period do symptoms typically begin?	1-3 days	246	41.0
	4-7 days	284	47.3
	8-14 days	60	10.0
	More than 14 days	10	1.7
Before the onset of your period, do you experience a fluctuating mood, notable feelings of sadness or hopelessness, irritability, and anger, and/or become extremely anxious?	No	60	10.0
	Yes	540	90.0
In the week before your period, do you notice that you lack interest in activities you usually enjoy, such as going out with friends, your hobbies, or your job?	No	198	33.0
	Yes	402	67.0
Prior to menstruation, do you find it more difficult to concentrate or focus on tasks?	No	264	44.0
	Yes	336	56.0
Do you feel lethargic or get tired more easily in the week leading up to your period in comparison to the rest of your cycle?	No	114	19.0
	Yes	486	81.0
When you are due on your period, are you more likely to indulge in overeating or crave certain foods?	No	172	28.7
	Yes	428	71.3
Many women with PMDD report experiencing hypersomnia or insomnia before menses. Do you find yourself to be either excessively sleepy or unable to sleep during this time?	No	220	36.7
	Yes	380	63.3
Before your period begins, do you feel overwhelmed or out of control?	No	172	28.7
	Yes	428	71.3
In the week prior to menstruation, do you experience physical symptoms such as breast tenderness or swelling, joint or muscle pain, bloating, or weight gain?	No	98	16.3
	Yes	502	83.7

The data presented in Table 5 elucidates various risk factors associated with premenstrual dysphoric disorder (PMDD) among 600 participants, highlighting notable trends in lifestyle and health behaviors. A striking 39.3% of participants reported predominantly unhealthy dietary habits, with 35.3% indicating mostly healthy habits but with occasional indulgences. This suggests a majority (74.6%) engaging in less-than-ideal dietary practices, which may exacerbate PMDD symptoms. In terms of physical activity, a significant 30.7% reported no exercise, while an additional 32.3% exercise rarely, implying that over 63% of respondents do not meet recommended activity levels, potentially increasing their risk profile for PMDD. Furthermore, caffeine consumption reveals that 59.3% consume low

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quantities, with just 20% abstaining from caffeine altogether. The smoking status is notably in favor of non-smokers at 91%, but the familial history of PMDD is concerning, as 61.7% of participants remain uncertain about any genetic predisposition, which may necessitate further investigation.

Table (5): participants' risk factors of premenstrual dysphoric disorder (n=600).

Parameter		***No.***	***Percent (%)***
How would you describe your typical dietary habits?	Healthy and balanced	98	16.3
	Mostly healthy, but with occasional indulgences	212	35.3
	Mostly unhealthy, with occasional healthy choices	236	39.3
	Unhealthy and unbalanced	54	9.0
How often do you engage in physical exercise?	Never.	184	30.7
	Rarely (less than once a week).	194	32.3
	Occasionally (1-2 times a week).	136	22.7
	Regularly (3-5 times a week).	78	13.0
	Daily (more than 5 times a week).	8	1.3
How often do you consume caffeine (coffee or tea)?	None	120	20.0
	Low (1-2 cups/day)	356	59.3
	Moderate (3-4 cups/day)	100	16.7
	High (5+ cups/day)	24	4.0
Are you Smoking?	Non-smoker	546	91.0
	Occasional Smoker	34	5.7
	Regular Smoker	16	2.7
	Ex Smoker	4	.7
Do you have any family members or relatives have a history of premenstrual syndrome or premenstrual dysphoric disorder?	Yes	64	10.7
	No	166	27.7
	I don't know	370	61.7
Are you taking any of these contraceptives?	Intrauterine device	4	.7
	Pills	20	3.3
	None	560	93.3
	Other	16	2.7

Table (6) shows that experiencing PMS symptoms has statistically significant relation to menstrual cycle regularity (P value=0.018). It also shows statistically insignificant relation to age, height, weight,

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nationality, social status, educational level, ranking GPA, and age at menarche.

Table (6): Relation between experiencing PMS symptoms and sociodemographic characteristics.

Parameters		***Before the onset of your period, do you experience a fluctuating mood, notable feelings of sadness or hopelessness, irritability, and anger, and/or become extremely anxious?***		***Total (N=600)***	***P value****
		No	**Yes**		
Age	less than 20 years	12	106	118	0.282
		20.0%	19.6%	19.7%	
	20 to 22	18	206	224	
		30.0%	38.1%	37.3%	
	23 years old	14	136	150	
		23.3%	25.2%	25.0%	
	more than 23 years	16	92	108	
		26.7%	17.0%	18.0%	
Height	less than 155 cm	8	134	142	0.081
		13.3%	24.8%	23.7%	
	155 to 159 cm	20	164	184	
		33.3%	30.4%	30.7%	
	160 to 165 cm	20	182	202	
		33.3%	33.7%	33.7%	
	more than 165 cm	12	60	72	
		20.0%	11.1%	12.0%	
Weight	less than 50 kg	14	162	176	0.162
		23.3%	30.0%	29.3%	
	50 to 55 kg	8	114	122	
		13.3%	21.1%	20.3%	
	56 to 60 kg	14	84	98	
		23.3%	15.6%	16.3%	
	more than 60 kg	24	180	204	
		40.0%	33.3%	34.0%	
Nationality	Non-Saudi	0	28	28	0.071
		0.0%	5.2%	4.7%	
	Saudi	60	512	572	
		100.0%	94.8%	95.3%	
Social status	Single	54	484	538	0.929
		90.0%	89.6%	89.7%	
	Married	6	56	62	
		10.0%	10.4%	10.3%	
Educational level	University, 1st year	8	60	68	0.513
		13.3%	11.1%	11.3%	

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	University, 2nd year	6	88	94	
		10.0%	16.3%	15.7%	
	University, 3rd year	4	68	72	
		6.7%	12.6%	12.0%	
	University, 4th year	8	54	62	
		13.3%	10.0%	10.3%	
	University, 5th year	12	92	104	
		20.0%	17.0%	17.3%	
	University, 6th year	22	178	200	
		36.7%	33.0%	33.3%	
Ranking GPA	Excellent	43	320	363	0.130
		71.7%	59.3%	60.5%	
	Good	17	210	227	
		28.3%	38.9%	37.8%	
	Fair	0	10	10	
		0.0%	1.9%	1.7%	
Age at menarche	Under 10 years	2	22	24	0.491
		3.3%	4.1%	4.0%	
	10-12 years	32	254	286	
		53.3%	47.0%	47.7%	
	13-15 years	20	228	248	
		33.3%	42.2%	41.3%	
	Above 15 years	6	36	42	
		10.0%	6.7%	7.0%	
Menstrual cycle regularity	Irregular	8	148	156	0.018
		13.3%	27.4%	26.0%	
	Regular	52	392	444	
		86.7%	72.6%	74.0%	

****P value was considered significant if ≤ 0.05.***

Table (7) shows that noticing lack of interest in activities before the period has statistically significant relation to nationality (P value=0.031), educational level (P value=0.013), and ranking GPA (P value=0.005). It also shows statistically insignificant relation to age, height, weight, social status, age at menarche, and menstrual cycle regularity.

Table (7): Noticing lack of interest in activities before the period in association with sociodemographic characteristics.

Parameters	***In the week before your period, do you notice that you lack interest in activities you usually enjoy, such as going out with friends, your hobbies, or your job?***		***Total (N=600)***	***P value****
	No	**Yes**		

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Age	less than 20 years	34	84	118	0.091
		17.2%	20.9%	19.7%	
	20 to 22	68	156	224	
		34.3%	38.8%	37.3%	
	23 years old	62	88	150	
		31.3%	21.9%	25.0%	
	more than 23 years	34	74	108	
		17.2%	18.4%	18.0%	
Height	less than 155 cm	36	106	142	0.124
		18.2%	26.4%	23.7%	
	155 to 159 cm	62	122	184	
		31.3%	30.3%	30.7%	
	160 to 165 cm	76	126	202	
		38.4%	31.3%	33.7%	
	more than 165 cm	24	48	72	
		12.1%	11.9%	12.0%	
Weight	less than 50 kg	60	116	176	0.926
		30.3%	28.9%	29.3%	
	50 to 55 kg	40	82	122	
		20.2%	20.4%	20.3%	
	56 to 60 kg	34	64	98	
		17.2%	15.9%	16.3%	
	more than 60 kg	64	140	204	
		32.3%	34.8%	34.0%	
Nationality	Non-Saudi	4	24	28	0.031
		2.0%	6.0%	4.7%	
	Saudi	194	378	572	
		98.0%	94.0%	95.3%	
Social status	Single	182	356	538	0.203
		91.9%	88.6%	89.7%	
	Married	16	46	62	
		8.1%	11.4%	10.3%	
Educational level	University, 1st year	14	54	68	0.013
		7.1%	13.4%	11.3%	
	University, 2nd year	26	68	94	
		13.1%	16.9%	15.7%	
	University, 3rd year	22	50	72	
		11.1%	12.4%	12.0%	
	University, 4th year	22	40	62	
		11.1%	10.0%	10.3%	
	University, 5th year	30	74	104	
		15.2%	18.4%	17.3%	
	University, 6th year	84	116	200	
		42.4%	28.9%	33.3%	

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Ranking GPA	Excellent	133	230	363	0.005
		67.2%	57.2%	60.5%	
	Good	59	168	227	
		29.8%	41.8%	37.8%	
	Fair	6	4	10	
		3.0%	1.0%	1.7%	
Age at menarche	Under 10 years	14	10	24	0.055
		7.1%	2.5%	4.0%	
	10-12 years	94	192	286	
		47.5%	47.8%	47.7%	
	13-15 years	78	170	248	
		39.4%	42.3%	41.3%	
	Above 15 years	12	30	42	
		6.1%	7.5%	7.0%	
Menstrual cycle regularity	Irregular	42	114	156	0.061
		21.2%	28.4%	26.0%	
	Regular	156	288	444	
		78.8%	71.6%	74.0%	

P value was considered significant if ≤ 0.05.

Discussion:

Premenstrual syndrome (PMS) is defined by a collection of physical and psychological symptoms that emerge 1 to 2 weeks prior to menstruation, diminish with the start of menstrual flow, and exhibit a cyclical and recurrent pattern. Beyond premenstrual tension, PMS can be severe enough to affect various aspects of a woman's life [15]. The exact cause of PMS is still unclear, but the symptoms are linked to the sensitivity of certain women to the normal hormonal fluctuations that occur during the menstrual cycle [16]. Premenstrual symptoms frequently improve with the administration of ovulation inhibitors during pregnancy and after menopause, providing strong evidence of their connection to cyclic ovarian activity. Furthermore, the stabilization of neurotransmitters such as serotonin, along with alterations in the effects of gamma-aminobutyric acid (GABA) through the use of antidepressants or anxiolytics, can alleviate PMS symptoms. Thus, it seems that these neurotransmitters play a crucial role in the manifestation of premenstrual symptoms [17]. The primary symptoms reported by women with PMS include increased breast size and tenderness, swelling, weight gain, headaches, acne, anxiety, irritability, depression, mood swings, and appetite changes. The severity of these symptoms varies among women. Many experience mild symptoms during their reproductive years, such as breast engorgement and edema, which they do not find distressing or debilitating. Conversely, some women endure severe and disabling symptoms that may lead to a more serious form of PMS known as premenstrual dysphoric disorder (PMDD) [18]. PMDD is characterized by significant and debilitating psychiatric symptoms that can disrupt relationships, work, or social activities to a degree comparable to severe depression [19]. Thus, we aimed in this study to determine the prevalence, severity and factors influencing premenstrual syndrome and premenstrual dysphoric disorder among female university students in the Kingdom of Saudi Arabia.

The findings from various studies regarding premenstrual syndrome provide a comprehensive

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perspective on the prevalence and impact of this condition across different populations, which can be compared to our research conducted among Saudi university students. A notable study by Ana Paula Rodrigues Rezende et al., [20] indicated a PMS prevalence of 46.9%, with a comparatively lower prevalence of premenstrual dysphoric disorder (PMDD) reported at 11.1%. The symptomatology demonstrated in their study highlighted physical symptoms such as breast tenderness and bloating (73%), complemented by significant psychological indicators including increased sensitivity to rejection and food cravings, affecting over 60% of the participants. Furthermore, over one-third reported that these symptoms moderately interfered with their academic and social lives. This contrasts with our study, where issues like mood swings were considerably more reported at 87.3%. Similarly, Ayla Acikgoz et al. [21] found a PMS prevalence of 58.1% among university students, underscoring that lifestyle factors such as smoking, alcohol consumption, and poor dietary habits heightened the likelihood of severe PMS symptoms. This finding resonates with our data which highlighted unhealthy dietary habits as a prevalent risk factor among the participants. In an additional study by Haleama Al Sabbah et al. [22], a staggering 83.0% of participants reported psychological symptoms linked to PMS, with over 69.6% indicating feelings of loss of control. These findings reinforce our observation of significant emotional instability among our participants. Further insights from Nour Mohammad Bakhshani et al. [23] revealed that 98.2% of their cohort experienced at least one PMS symptom, with fatigue (84%) and fluctuating moods (72.3%) being prevalent. Curiously, the severity of symptoms varied with age, showing younger women (18-20 years) experiencing greater severity, which contrasts with our results where severity did not significantly correlate with age. Additionally, research studies conducted in Turkey indicated a considerable variation in PMS prevalence, ranging from 40% to 90% [24,25], highlighting that cultural and geographical contexts greatly influence women's experiences and expressions of PMS. Notably, a population study in the United Kingdom revealed an inverse association between education levels and PMS occurrence, whereas a Brazilian study suggested that higher education levels correlate with increased PMS prevalence [26,27]. Meanwhile, research in Poland documented that factors like BMI, smoking, and physical activity did not significantly correlate with PMS prevalence, though urban living was associated with higher rates [28]. Collectively, these studies illustrate the complex socio-cultural and health-related dynamics surrounding PMS. In comparison, our findings of a 90% prevalence of PMDD symptoms and the significant correlation with menstrual regularity suggest that the awareness of PMS in different cultural contexts can significantly shape the experiences and severity of its manifestations.

Conclusion:

The study highlights the significant prevalence and severity of premenstrual syndrome and premenstrual dysphoric disorder among female university students in Saudi Arabia. With 90% of participants reporting PMDD symptoms and the majority experiencing severe mood swings and fatigue, it is evident that PMS has a substantial impact on their psychological well-being and daily functioning. Furthermore, our findings indicate that unhealthy lifestyle factors may exacerbate PMS symptoms, emphasizing the need for increased awareness and proactive management of this condition. As PMS continues to be underestimated, further research is essential to explore effective interventions and support systems for affected women, thereby improving their quality of life and academic performance. This study not only contributes valuable insights to the existing literature on PMS but also underscores the importance of addressing this often-overlooked aspect of women's health in diverse cultural contexts.

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Ethical approval:

After fully explaining the study and emphasizing that participation is optional, each participant gave their informed consent. The information gathered was safely stored and utilized exclusively for study.

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Conflict of interests:

The authors declare no conflict of interest.

Informed consent:

Written informed consent was acquired from each individual study participant.

Data and materials availability:

All data associated with this study are present in the paper.

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