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PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.2551688>Available online at: <http://www.iajps.com>**Research Article****PREVALENCE OF PREMENSTRUAL SYNDROME AMONG
MEDICAL AND NURSING STUDENTS AT TAIBAH UNIVER-
SITY, MADINAH, KSA****Abrar Humaidi Alhubayshi*, ArwaDhaif Allah Hamzah Aljuwayd**, Ruba Mohammed Saeed*, Maryam Azim Nashy Al-Harby*, Noha Mohammed Raji Alraddadi*, Ayat Roushdy Ahmed Abdullah***

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Abstract:

Background: Premenstrual syndrome (PMS) was frequent among young women worldwide. The prevalence of PMS has been reported in 20 to 32 % of premenopausal and 30-40% of the reproductive female population .A little is known about it among Saudi university students.

Aim: To estimate Premenstrual Syndrome prevalence among Female medical and nursing students at Taibah University, Madinah, Saudi Arabia and to identify its associated predictors.

Materials and Methods: Across sectional study was conducted over 600 Medical & Nursing students over the academic year of 2017 /2018. An electronic Questionnaire has been used for data collection. The PMS was assessed by the PMS scale with its lowest score of 42 and highest score of 210. The prevalence of PMS was estimated and related to students' characteristics. For statistical analyses purposes, Univariate analyses and predictive regression analyses has been used.

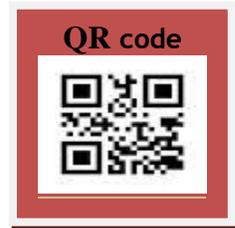
Results: The final rate of response rate was 87.3%.PMS prevalence in the respondents (N=524) female students was 50.2% (263/524; 95% CI= 45.8-54.6%). The prevalence was varied by students' characteristics. The predictors of PMS in this study were the age at menarche, daily sleeping hours and dietary habit. Students with their age at menarche between 12-13 years showed significant reduced by 45% among (OR= 0.55; 95% CI= 0.35-0.92), the same is also applies among those with 5-8 sleeping hours per day (OR= 0.50; 95% CI= 0.27-0.99). Daily consumption of chocolate, caffeine and diary food, however, were associated with increased risk.

Conclusion: A considerable high prevalence of PMS was found among the studied students. Health education, medical treatment and counseling services should be available at health care facilities.

Keywords: Premenstrual syndrome, Prevalence, Risk factors, Saudi Arabia

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INTRODUCTION:

The menstrual cycle is a physiologic process during which regular natural changes which helps pregnancy possible to occur in the female reproductive system [1]. However, during one to two weeks prior to menstruation , around 80% of participating women report the experience of some symptoms [2]. The symptoms include both bodily signs and symptoms, along with breast tenderness, back pain, stomach cramps, headache, and changes in urge for food, as well as psychological signs of anxiety, depression, and unrest [3]. The occurrence of one or more of these symptoms between ovulation and the onset of menstruation refer to premenstrual syndrome (PMS) [4]. The intense sorts of this syndrome are known as premenstrual dysphoric disorder (PMDD). Approximately eighty percent of all menstruating ladies experience some symptoms that occur before or during menstruation, and about 3-7% of ladies revel in the more severe PMS [4]. Since symptoms affect the normal life, in 20 to 30% of women they qualify as premenstrual syndrome [2], and the reason why some ladies get extreme PMS even as others have none is not understood. The premenstrual syndrome (PMS) is characterized by the presence of both physical and behavioral (including affective) symptoms that occur repetitively in the second half of the menstrual cycle and interfere with some aspects of the woman's life.(5). According to the International Classification of Diseases tenth revision (ICD-10) , Premenstrual syndrome is labeled as Premenstrual Tension Syndrome, and it is classified under "Diseases of the genitourinary system: Pain and other conditions associated with female genital organs and menstrual cycle" [9].

The prevalence of PMS in previously mentioned studies was up to 80%.In 2003, a Saudi study has been conducted in Dammam on 464 young women, by 448 women (96.6%) , at least one symptom of premenstrual syndrome ,while by 176 of them (37.5%) experienced a high symptom severity score [10]. Also, a recent cross-sectional survey conducted

in Egypt showed 86.3% of the studied women have

had PMS. Among medical students in Turkey a cross sectional conducted reported the prevalence of PMS was 58.1%.¹² Smoking, chronic illness or anemia were considered as factors correlated with PMS, include physical activity, consumption of foods of high sweet content, and coffee were correlated with PMS. [10-12]. A significant high rate of PMS has been shown among students who ate food high in fat and calories [12]. Up till now, shortage of data about this important syndrome has been shown in the Saudi literature particularly among University students. This study has been done among female students in colleges of Medicine and Nursing at Taibah University, Madinah, Saudi Arabia to predict the prevalence rate of the Premenstrual syndrome & the possible related predictors among them.

MATERIALS AND METHODS:

A cross-sectional study was performed among medical & nursing at Taibah University in Madinah, Saudi Arabia from September to November 2018 . Madinah city is the second Holly city in the Kingdom and is situated in Al Hijaz region to north of Makkah city.¹³ In 2010, the population of Madinah city has estimated to be around 1.8 million (1.3 million are Saudi).¹⁴ The city included two governmental universities: Islamic University and Taibah University. Taibah University established in 2003 and there were 7761 enrolled students. Today, there are 63815 students enrolled in 28 colleges. The study was conducted to assess the prevalence of PMS and to identify possible predictors of the syndrome among them. All female students registered in Colleges of medicine and nursing during academic year 2017/18, were invited to participate in this study. An electronic designed questionnaire was used to collect data from participants. The respondents' personal, reproductive and dietary habit data were screened by the questionnaire .

The outcome variable in this study of premenstrual

syndrome in this study was assessed by the premenstrual syndrome scale (PMSS). The scale used to assess premenstrual symptoms it was developed by Gençdoğan. Type of the scale is a Likert scale ,contains 42 items ,each with 5 choices ('Never', 'Rarely', 'Occasionally', 'Sometimes', 'Always'). The scale has 9 subclasses which are: depressive affect, anxiety, fatigue, irritability, depressive ideas, pain, changes in appetite, changes in sleep and abdominal bloating. The scores of these 9 categories should be summed to form the total score. The score 42 was the lowest score of the scale while the highest one was 210. Premenstrual symptoms intensity is indicated on the scale by a high score , a high one indicates a high intensity syndrome . After the evaluation of PMSS results, they can be interpreted as either "There is PMS" or "There is no PMS". A score higher than 50% of the highest score obtained from the total score is the defining factor [16].

The study questionnaire was sent to the registered 600 students in both studied Colleges through social media application (WhatsApp, Facebook and Twitter). At the end of data collection period, 524 students returned back the filled questionnaire with a participation rate of 87.3%.

Ethical approval was taken from the Scientific Research Ethics Committee at Taibah University. An Informed consent was taken from all participants . Data privacy and confidentiality was considered throughout the study

The Statistical program used for data analysis was the Statistical program for Social Science (SPSS: Chicago, Illinois: SPSS Inc. Version 20.0). The data were presented by its frequency number and percent and mean \pm SD. Premenstrual syndrome prevalence among the studied students was assessed and its 95% confidence interval was calculated. Premenstrual syndrome prevalence among the studied students was compared by their personal and reproductive characteristics using Chi square and Fischer exact tests as appropriate. The level $P < 0.05$ was considered as an indicator for statistically significant difference.

To test the relationship of PMS with the students' characteristics Univariate logistic regression analyses were used .Students with PMS were considered as cases and non PMS students as controls. Multivariate logistic regression analysis was used to predict factors of high importance in affecting the risk of PMS among the studied students using stepwise model with the criteria of model inclusion and exclusion was 0.05 and 0.10, respectively.

RESULTS:

A total of 524 female students from the faculties of medicine and nursing at Taibah University, Madinah, Saudi Arabia were included in this study to figure out the premenstrual syndrome (PMS) prevalence among them and to investigate the factors participating in this syndrome. The mean PMS scoring scale among the studied students was 105 ± 35.8 and it was ranging from 42 to 210 with a median of 101. According to the used the cutoff point of PMS scoring scale (the median), the premenstrual syndrome (PMS) prevalence among the studied students was 50.2% (263/524; 95% CI= 45.8-54.6%). Of PMS students, 68.1% of them reported severe and very sever PMS symptoms representing 34.2% of the whole studied students.

Table 1 shows the personal characteristics of the studied students. More than half of students were aged < 23 years (54.0%). About three quarter of the students was from college of medicine (74.2%) and the majority of them were Saudis (98.7%) and single (85.1%). Nearly, two-third of the studied students reported their age at menarche between 12 and 13 years and regular menstrual cycle (67.2% and 66.8%, respectively). Contraceptive use was found in 11.5% of students and about one third reported to practice aerobic physical activity (31.9%). Sixty five percent of the students reported to sleep 5-8 hours a day and small percent reported daily consumption of fruits and vegetables (17.4%).

Table 1: Personal characteristics of the studied students

Characteristics*	N= 524
Age categories in years	
< 23	284 (54.0)
23-28	235 (45.0)
> 28	5 (1.0)
Students' Faculty	
Medicine	389 (74.2)
Nursing	135 (25.8)
Nationality	
Saudi	517 (98.7)
Not Saudi	7 (1.3)
Marital status	
Single	446 (85.1)
Married	78 (14.9)
Age at menarche	
< 12	89 (17.0)
12-13	352 (67.2)
> 13	83 (15.8)
Cycle regularity	
Regular	350 (66.8)
Irregular	174 (33.2)
Contraceptive use	
Yes	60 (11.5)
No	464 (88.5)
Aerobic exercise	
Yes	167 (31.9)
No	357 (68.1)
Sleep hours	
< 5	48 (9.2)
5- 8	342 (65.3)
> 8	134 (25.5)
Daily dietary habit	
Fruit and vegetables	91 (17.4)
Caffeine, chocolate, salt and canned	143 (27.3)
Diary food	61 (11.6)
Caffeine, chocolate and diary food	229 (43.7)

*data are presented by n (%).

Table 2: Prevalence of PMS among the studied students by their personal characteristics

Characteristics	PMS Yes (n= 263)		PMS No (n= 261)		P value
	No.	%*	No.	%*	
Age categories in years					
< 23	149	56.6	135	51.7	0.24
23-28	113	43.0	122	51.9	
> 28	1	0.4	4	1.5	
Students' Faculty					
Medicine	189	71.8	200	76.6	0.21
Nursing	74	28.2	61	23.4	
Nationality					
Saudi	260	99.0	257	98.5	0.69
Not Saudi	3	1.0	7	1.5	
Marital status					
Single	217	82.5	229	87.7	0.09
Married	46	16.5	32	12.3	
Age at menarche					
< 12	55	21.0	34	13.0	0.02*
12-13	162	61.6	190	73.0	
> 13	46	17.4	37	14.0	
Cycle regularity					
Regular	179	68.0	171	65.5	0.53
Irregular	84	32.0	90	34.5	
Contraceptive use					
Yes	32	12.1	28	10.7	0.17
No	231	87.9	233	89.3	
Aerobic exercise					
Yes	85	32.0	82	31.5	0.82
No	178	68.0	179	68.5	
Sleep hours					
< 5	29	11.0	19	7.3	0.03*
5- 8	157	60.0	185	70.9	
> 8	77	29.0	57	21.8	
Dietary habit					
Fruit and vegetables	27	10.3	64	24.5	0.0001*
Caffeine, chocolate, salt and canned food	74	28.2	69	26.5	
Diary food	30	11.4	31	12.0	
Caffeine, chocolate and diary food	32	50.1	97	37.0	

*Percentages are rounded.

**Significant.

Table 2 shows prevalence of PMS among the participating students according to their personal characteristics. Although, by most studied factors in the prevalence of PMS there were no statistically differences of significant, the prevalence of PMS was higher among students aged < 23 years (56.6%), medical students (71.8%), Saudis (99%), single students (82.5%), regular cycle students (68.1%) and among those not using contraceptive method (87.9%). On the other hand, however, The prevalence was significantly and markedly higher among students with their age at menarche was 12-13 years (61.6%), students reported to sleep 5-8 hours daily (60%), and among those reported daily consumption of chocolate, caffeine and diary food (50.1%). The lowest prevalence of PMS among the studied

students was among those reported daily consumption of fruits and vegetables (10.3%).

Table 3: Relation of personal characteristics and risk of PMS among the studied students: Univariate logistic regression analysis

Characteristics	PMS (n= 263)	Non-PMS (n= 261)	OR	95% CI	P value
Age categories in years					
< 23	149	135	1.00	Ref.	
23-28	113	122	0.85	0.60-1.18	0.32
> 28	1	4	0.23	0.10-2.10	0.18
Students' Faculty					
Medicine	189	200	0.80	0.55-1.15	0.21
Nursing	74	61	1.00	Ref.	
Nationality					
Saudi	260	257	1.35	0.30-6.10	0.69
Not Saudi	3	7	1.00	Ref.	
Marital status					
Single	217	229	1.00	Ref.	
Married	46	32	1.50	0.95-2.47	0.09
Age at menarche					
< 12	55	34	1.00	Ref.	
12-13	162	190	0.52	0.32-0.89*	0.01
> 13	46	37	0.75	0.40-1.41	0.39
Cycle regularity					
Regular	179	171	1.00	Ref.	
Irregular	84	90	0.90	0.62-1.25	0.53
Contraceptive use					
Yes	32	28	0.87	0.40-1.50	0.0.30
No	231	233	1.00	Ref.	
Aerobic exercise					
Yes	85	82	1.05	0.75-1.50	0.82
No	178	179	1.00	Ref.	
Sleep hours					
< 5	29	19	1.00	Ref.	
5- 8	157	185	0.55	0.30-0.98*	0.04
> 8	77	57	0.90	0.45-1.70	0.70
Dietary habit					
Fruit and vegetables	27	64	1.00	Ref.	
Caffeine, chocolate, salt and canned food	74	69	2.50	1.45-4.43*	0.001
Diary food					
Caffeine, chocolate and diary food	30	31	2.30	1.16-4.50*	0.02
	32	97	3.20	1.91-5.42*	<.0001

*Significant

Table 3 shows the risk of PMS among the studied medical students by their personal characteristics. The risk of PMS was found to insignificantly decrease by increasing age of the studied students with marked decrease among students age > 28 years (OR= 0.23; 95% CI= 0.10-2.10). Compared with students in nursing program, the risk was slightly decreased in medic al students. Married students showed a high not significant risk of 1.5 times compared with single students. A significant risk reduction was found among students with their age at the time of first menstrual cycle (menarche) between 12-13 years old (OR= 0.52; 95% CI= 0.32-0.89), and among those reported sleeping of 5-8 hours a day (OR= 0.55; 0.30-0.98). A non significant increased risk was found among students using contraceptive method (OR= 1.40; 95% CI=0.90-2.10). A non significant increased risk was found among students using contraceptive method (OR= 1.40; 95% CI=0.90-2.10). The highest considerable increased risk was found among the students reported daily chocolate and caffeine, diary food, and caffeine and diary food with OR of 2.5, 2.2, and 3.2,

respectively.

Table 4: Predictors of PMS among the studied students: Results from predictive logistic regression model*

	PMS (n= 263)	Non-PMS (n= 261)	OR	95% CI	P value
Age at menarche					
< 12	55	34	1.00	Ref.	
12-13	162	190	0.55	0.35-0.92**	0.02
> 13	46	37	0.80	0.45-1.51	0.50
Sleep hours					
< 5	29	19	1.00	Ref.	
5- 8	157	185	0.50	0.27-0.99**	0.04
> 8	77	57	0.75	0.40-1.51	0.42
Dietary habit					
Fruit and vegetables	27	64	1.00	Ref.	
Caffeine, chocolate, salt and canned food	74	69	2.60	1.50-4.54**	0.001
Diary food					
Caffeine, chocolate and diary food	30	31	2.20	1.10-4.40**	0.02
	32	97	3.20	1.90-5.51**	<.0001

* according to the predicted regress model; including all the variables in table 3.

**it is significant

Table 4 shows the outcomes of predictive logistic regress model through all the variables studied in the prior tables. In this study Predictors of PMS were their age at menarche, sleep hours and dietary habit. The risk was significantly reduced by 45% among students with their age at first menstrual cycle (menarche) between 12-13 years (OR= 0.55; 95% CI= 0.35-0.92), and 50 % among those reported to sleep 5-8 (OR= 0.50; 95% CI= 0.27-0.99). Compared to fruit and vegetable dietary habit, the risk was found to significantly increase among students reported daily eating of chocolate and caffeine (OR =2.6), diary food (OR= 2.2) and caffeine, chocolate and diary food (OR= 3.2). These factors were found to explain 64% of the risk variation of PMS among the studied students.

Table 5: Use of PMS treatment among the studied students

Treatment of PMS	No (%)
Non steroidal anti-inflammatory drugs and pain killer	282 (54.0)
Herbal medication	105 (20.1)
Diuretics	9 (1.7)
Vitamin supplementation	11 (2.0)
Hot fomentation	5 (0.9)
No thing	112 (21.3)

Table 5 presents the use of PMS treatment among the studied students. The treatment modalities used were varied among the studied students. There 282 (54%) reported the use of non steroidal anti-inflammatory and pain killers. Herbal medication was found in 105 students (20.1%). The use of diuretics, vitamin supplementation and hot fomentation were reported by 1.7%, 2% and 0.9%, respectively. Of the studied students, there were 112 (21.3%) reported no thing to do in case of PMS.

DISCUSSION:

In the current study, Premenstrual syndrome prevalence was 50.2% (263/524; 95% CI= 45.8-54.6). Of PMS students, more than two-third of them (68.1%) reported severe and very severe PMS symptoms representing 34.2% of the whole studied students. The mean PMS scoring scale among the studied students was 105 ± 35.8 and it was ranging from 42 to 210

with a median of 101.

Although the obtained PMS prevalence among the studied women is relatively high, it was considered lower than that reported in other similar local and regional studies. In Dammam among 464 young women, a Saudi study showed prevalence rate of (96.6%) among women, at least one premenstrual symptom was experienced, while symptom-severity

of a high score had been experienced by 176 (37.5%).¹⁰ In Egypt, the prevalence of PMS among the studied girls (12-25 years) from Beni-Suif city was as high as 86.3%.¹¹ In Turkey, a cross sectional study conducted among medical students showed that the PMS prevalence is 58.1%.¹² Another study in Ethiopia was conducted on female students (from 18 to 25 years) of health sciences college at Mekelle University, about PMS prevalence and impacts among them and showed that 144 (83.2%) of the participants have had at least one PMS symptoms.¹⁷ In Brazil over a population based study was conducted over 1395 women aged 15-45 years, it showed that self reported PMS prevalence was 60.3%.¹⁸

In United Arab Emirates Among adolescent school girls, a PMS prevalence rates of 16.4% was found, which is a much lower rate. In America, Among 971 women between 18-45 years, PMS Prevalence rate has been found to be of 17.3%.²⁰

Among the studied women in different countries and by cultural settings, the prevalence of PMS was found to vary accordingly. A Meta analysis study has been done over 17 studies from different countries including 18803 people. The pooled prevalence of PMS was 48%. Pooled prevalence of PMS reported in Europe was 40%, while in Africa it was 85%, 46% in Asia, while in South America it was 60%.²¹ The Premenstrual syndrome prevalence among students in this study was also found to vary by their personal, reproductive and dietary habit factors. The prevalence was significantly and markedly higher among students with their age at menarche was 12-13 years (61.6%), students reported to sleep 5-8 hours daily (60%), and among those reported daily consumption of chocolate, caffeine and diary food (50.1%). The lowest prevalence of PMS among the studied students was among those reported daily consumption of fruits and vegetables (10.3%). Among unmarried students, the prevalence was 82.5%. A study has been conducted At Al-Qassim University among 172 unmarried medical students (18-25 years), the prevalence of PMS was 78.5%, of them, 5.9% had severe degree of PMS.²²

The results of both univariate and multivariate logistic regression models have revealed the important role of age at menarche, sleep hours and dietary habit on the risk of PMS among the studied students. Other studied personal and reproductive factors, however, have appeared to have minimal role in the risk of PMS. In the multivariate model, the daily consumption of chocolate and caffeine, diary food and all of these items was found in the predictive models to

significantly increase the risk of PMS among the studied students compared to those reported daily consumption of fruits and vegetables with OR of 2.6, 2.2 and 3.2, respectively. Consistent with high risk associated with the dietary habit in this study, PMS was significantly associated with consumption of sweet-tasting foods, and coffee among medical students in Al-Qassim University.²² In a study done among Turkish University students, those who habitually ate foods of great amount of fat and calorie the risk of PMS was estimated to be 1.6 times,¹² and there are several results supporting this finding in literature, caffeine intake has a role in the Premenstrual syndrome exacerbation in researches conducted on medical students,²³ and general population.²⁴ In addition, PMS and irregular eating or consumption of salt and coffee association was found in some research.^{25,26} To decrease the PMS symptoms among university students it is recommended to Encourage dietary habit and a healthy balanced diet has a value. Also, the students have to be encouraged to change their dietary habit concerning these foods.

As found in this study, the socio-demographic characteristics showed no significant correlation with PMS in studies conducted on university students.^{17,27} For other personal characteristics, the literature showed that during adolescence there is increased risk for PMS among smoker and alcohol drinking.²⁵⁻²⁸ These factors, however were not assessed in the current study.

With the exception of age at menarche, other studied menstrual factors showed no significant association with the risk of PMS. Similarly in several other studies, characteristics of the menstrual cycle and PMS have shown no significant relationship.^(25, 29) On the other hand, increased risk of PMS has been shown among women with menstrual irregularities²⁶ and those with a prolonged menstrual duration.²⁹

The risk of PMS was significantly reduced by 45% among students with their age at menarche between 12-13 years, the OR was 0.55 (95% CI= 0.35-0.92). manifestation of premenstrual symptoms and PMS According to this concept, showed a biological plausibility in relationship to age at menarche. This study results are in agreement with some studies,^{18,30} a higher prevalence rate of PMS has been shown among women who had menarche between 7 to 10 years of age compared to older age, but there was no difference of statistical significant regarding this. Also, daily sleeping between 5 to 8 hours was also found in this study to reduce the risk of PMS among the studied students by 50%. Similar to this finding, several studies have documented the role of enough

sleep in reducing and treating the symptoms associated with PMS.³¹⁻³³

The treatment modalities used by the studied students were varied with more than half of them (54%) reported to use of non steroidal anti-inflammatory and pain killers to treat their PMS symptoms. Similar results were also reported by several studies where pain killers were the most important medication used in this regard.^{10,11,17,33}

The current study, being University-based with a high response rate, which favors the findings of the study is considered as a strength. Furthermore, the study presented the risk of PMS with several studied personal, reproductive and dietary factors. According to available knowledge, this study is the first to address this problem among University students in Madinah city using a valid and reliable premenstrual syndrome scale (PMSS), and quantifying the prevalence of the problem by the characteristics of the studied students. Beside its documented validity,³⁴ the PMSS is one of the scales used among adolescents and on different age groups in the fertile period for PMS prevalence determination.

The present study appeared to have some limitations. The survey does not represent the whole female University student population, and hence the results can only be generalized to the Health Sciences students at the studied University. Under estimation of PMS among the studied students is potential risk in this study as it is sensitive studied topic, some respondents might not like to reveal their real personal problems. Finally, the causality between the studied factors and PMS cannot be determined for cross-sectional nature of this study. However, the obtained significant results which was consistent to other similar studies endorse the validity of the present study results.

CONCLUSION:

The present study showed a considerable high prevalence of PMS among University students in Madinah City. Consumption of chocolate, caffeine salted and canned food as well as dairy products were a significant predictor increasing PMS risk. On the other hand, however, enough sleeping hours was reducing the risk of PMS. Health education, medical treatment and counseling services should be available at University health care facilities in order to treat the affected students and to help them changing their dietary habit. More studies are needed including students from all University Colleges to confirm these findings.

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