

Original Research Article

The Relationship between Dietary Habits and Severity of Premenstrual Syndrome among Medical College Students at Najran University

Wafaa Taha Ibrahim Elgzar* and Heba Abdel-Fatah Ibrahim

Abstract

Assistant Professor, Department of Maternal and Child Health Nursing, Nursing College, Najran University

*Corresponding Author's E-mail: wafaa22006@yahoo.com

The objective of this study is to identify the prevalence and severity of premenstrual syndrome (PMS) among medical students at Najran University and discover the relationship between the students' dietary habits and the severity of their PMS. A descriptive correlational research design was utilized. The study was conducted at medical colleges (medicine, nursing and applied medical sciences) Najran University female campus. A convenience sample of all female students (n= 285) who registered in the three colleges at the time of study were included. Data was collected from the beginning of December 2016 till the end of February 2017. Three tools were used for data collection; 1) demographic and menstrual history questionnaire. 2) a modified version of PMS screening tool for clinicians. 3) Assessment of dietary habits questionnaire. Around one third of the participant complained from moderate to severe PMS. There were a positive, highly statistically significant correlations ($P < 0.01$) between the severity of PMS and fat/sweets consumption. On the other hand, there were negative, highly statistically significant correlations ($P < 0.01$) between the severity of PMS and complex carbohydrates, vegetables and protein. Moreover, there were positive, highly statistically significant correlations ($P < 0.01$) between caffeine containing beverages and severity of PMS. As well as there were a negative, highly statistically significant correlations ($P < 0.01$) between fenugreek, ginger, saffron and severity of PMS symptoms. There were positive, statistically significant correlations between the consumption of fats, sweets, caffeine containing beverages, packed juice and the severity of PMS.

Keywords: Premenstrual syndrome, dietary habits, medical college, Najran University.

INTRODUCTION

Menstrual cycle is the most significant landmark of the female reproductive system growth and development. This landmark is occasionally accompanied by several symptoms and signs, which are disturbing to the physical and psychological harmony in women (Armand, Talae, 2012). Premenstrual syndrome (PMS), is one of the most common disorders among females at the reproductive

age. It impairs academic performance, interpersonal and professional relationships (Amiri Farahani et al, 2011; Masoumi et al, 2016).

PMS is diagnosed when a woman experiences periodic physical, psychological and/ or behavioral symptoms that occur during the luteal phase of the menstrual cycle and disappear in the next follicular phase

or by the shedding of menstrual cycle. PMS is emerged in mild, moderate, or severe forms. Premenstrual dysphoric disorder (PMDD) is the extreme form of the PMS and is mostly psychological in nature. PMDD affect 3-5% of women in reproductive age and seriously impacts their daily lives. It also requires hospitalization and psychotherapy. PMDD will be excluded from the current study sample.(Chin, Nambiar, 2016)

Recently, there is a strenuous effort to reach a consensus on diagnostic criteria for PMS and to recognize core symptoms of the syndrome.(O'Brien et al, 2011) These symptoms include psychological, physical, cognitive, and behavioral one. Medical diagnosis of PMS requires that symptoms be recorded for at least two menstrual cycles and cause considerable distress or impairment of daily life. This assessment would be include at home, at school, at work, within interpersonal relationships and during social activities (O'Brien et al, 2011; Rapkin, Mikacich, 2013). Although the exact etiology of PMS is still unknown, several theories tried to clarify its occurrence. These theories include ovarian hormone theory, serotonin theory, psychosocial theory and psychosocial theory (Yonkers et al, 2008).

The PMS is prevalent in female university students. It may significantly be associated with psychological impairment, poor quality of life. Severe form of PMS have negative impact on social and academic performances of the student females by causing frequent school missing, exams missing, low grade scoring and academic withdrawal, which affect the quality of life of the students (Tolossa et al, 2014).

Moreover, nutritional/metabolic factors may play an important role in PMS; food cravings are a common complaint of women who experience PMS. Cravings tend to rotate around carbohydrate-rich foods, predominantly sugar, and alcohol. This may be because carbohydrates offer tryptophan, the precursor to serotonin (Hollins-Martin et al, 2014). Another contributing factor for PMS is deficiency of some vitamins and minerals. Calcium, magnesium and B vitamins are the most studied. Furthermore, BMI more than 30 is considered predictive for PMS (Bertone-Johnson et al, 2005).

It is clear that a healthy diet is an important part of PMS management. Recent research is showing that certain nutrients should be closely investigated if PMS-related symptoms occur. While diet alone likely will not prohibit PMS or treat it, it is certainly one of the first lines of management. Thus, offering health education programs on the benefits of nutrients in relieving PMS symptoms, such as calcium, vitamin D, B vitamins, thiamine and riboflavin, as well as magnesium and iron can help women to make optimal food selections providing the continued benefits of a healthy and balanced diet (Pitman et al, 2015).

Up to 80% women of reproductive age report having some symptoms prior to menstrual cycle. These symptoms classify as PMS in 20 to 30% of

women.(Biggs, Demuth , 2011) So PMS is predominantly common in the younger age groups and therefore represents a significant a main public health problem in young girls in Saudi Arabia. According to recent research, PMS was significantly linked with excessive sweetened food consumption, coffee and tea intake.(AL Ghadeer et al, 2016)Consequently , it is important to determine the relation between the dietary habits and the severity of PMS. If such relation were confirmed dietary, modification would be an important, culturally acceptable, available and easy approach for PMS management. So the purpose of this study was to identify the prevalence and severity of premenstrual syndrome among medical students at Najran University and discover the relationship between the students' dietary habits and the severity of their premenstrual symptoms.

Research Questions

- What is the prevalence and severity of premenstrual syndrome among medical colleges' students at Najran University?
- Is there a relationship between students' dietary habits and the severity of their premenstrual symptoms?

METHODS

This study was conducted at medical colleges (medicine, nursing and applied medical sciences) Najran University female campus. A descriptive correlational design was utilized. The study comprised a convenient sample of all female students registered in the three colleges, accepted to participate in the study. Total number was 285 female students. Exclusion criteria include; pregnancy, primary or secondary amenorrhea, and married students take hormonal contraceptives

Three tools was used for data collection: *Tool I; socio demographic and menstrual history questionnaire*. It was developed by the researcher to collect information related to demographic data such as: college, age, residence, marital status, weight, height and income. It also includes the menstrual history such as: age of menarche, menstrual interval, and duration. *Tool II, a modified version of premenstrual symptoms screening tool for clinicians (PSST)* (Steiner et al, 2003). It describes PMS physical, psychological and behavioral symptoms. The first entails 14 items its score ranges from 0 to 42, the second is composed of 12 items its score ranges from 0 to 36, and the later contains 6 items its score ranges from 0 to 18. For each one of the 32 items the subject has to choose one of four alternatives: (0) absent, (1) mild, (2) moderate, or (3) severe. The total tool score ranges from 0 to 96.*Tool III: assessment of dietary habits questionnaire*. It was developed by the researchers to collect information related to dietary habits. The students

Table 1. Percent distribution of the study sample according to their demographic characteristics and menstrual history (n=285)

demographic history	data/menstrual	No (285)	%
College			
- Nursing		124	43.5
- Medicine		81	28.4
- Applied medical science		80	28.1
Marital status			
- Married		33	11.6
- Single		252	88.4
Residence			
- Rural		40	14
- Urban		245	86
Income			
- Not enough		35	12.3
- Enough for living only		141	49.5
- Enough and can save from it		109	38.2
Age (Mean ± SD)		21.88±1.60 years	
BMI			
- Under weight		29	10.2
- Normal healthy weight		160	56.1
- Over weight		72	25.3
- Obese		24	8.4
Menstrual history			
Age at menarche			
- 9 to less than 12 years		43	15.1
- 12 to less than 15 years		165	57.9
- 15 and more		57	20
- Did not remember		20	7
Menstrual interval			
- Less than 21 day		65	22.8
- 21 to 35 day		150	52.6
- 36 day and more		10	3.5
- Irregular		60	21.1
Menstrual duration			
- Less than 3 days		34	11.9
- 3 to 5 days		96	33.7
- 6 to 8 days		146	51.2
- More than 8 days		9	3.2

were asked to record their daily intake from each food group for the past two months. The food groups were as follows; bread and grain products; milk and dairy products; proteins products; fruits, vegetables, oils, sweet foods. As well as daily intake from beverages such as (Arabian coffee, tea, cola, coffee, canned juices, fenugreek, warm milk, caraway, anise, green tea with mint, cinnamon and ginger)

All tools were tested for reliability by test-retest and for content validity by a jury of 5 experts in the field and one expert from the biostatistics. The internal consistency of the tools was done using Cronbach Alpha Coefficient test. The results were statistically acceptable (0.75, 0.68) for tool II, and III, respectively.

An official permission was obtained from the deanship of scientific research Najran University then from general supervisor of the medical colleges. The research proposal was approved from the ethical committee at college of nursing Najran University. Another oral

permission was taken from the dean of each college to collect data after explaining the purpose of the study. Oral consent was taken from each student. All students were ensured about confidentiality and anonymity of their data as it is used only for research purpose.

A pilot study was carried out on 10% of the students (who was excluded from the sample). The pilot study revealed the applicability of the tools then the necessary changes was undertaken. Data was collected from the students using questionnaire in the class rooms after lectures with the help of the coauthor. Each student was given about 15-20 minutes to complete the questionnaire. Data was collected daily during break time for a period of three months from the beginning of December 2016 till the end of February 2017.

The statistical analysis was done using Statistical Package for Social Sciences (SPSS version 20). correlation coefficients were used to answer the research questions. Descriptive statistics such as frequency,

Table 2. Percent distribution of the study subjects according to the severity of their PMS symptoms(n=285)

Severity of PMS	No or mild PMS		Moderate PMS		Severe PMS	
	No	%	No	%	No	%
PMS symptoms						
- Physical symptoms	198	69.5	71	24.9	16	5.6
- Psychological symptoms	149	52.3	96	33.7	40	14
- Behavioral symptoms	205	71.9	52	18.3	28	9.8
- Total PMS*	186	65.3	83	29.1	16	5.6

*Total is not mutually exclusive

Table 3. Relation between the severity of the subjects PMS symptoms and their BMI (n=285).

PMS symptoms		Underweight		Normal healthy weight		Overweight		Obese		Total	Test of significance	
PMS physical symptoms	No or mild	26	89.7	103	64.4	55	76.4	14	58.4	198	69.5	FET P=0.007*
	Moderate	3	10.3	48	30	15	20.8	5	20.8	71	24.9	
	Severe	0	0.0	9	5.6	2	2.8	5	20.8	16	5.6	
PMS psychological symptoms	No or mild	20	68.9	84	52.5	30	41.6	15	72.5	149	52.3	FET P=0.037*
	Moderate	3	10.3	56	35	31	43.1	6	25	96	33.7	
	Severe	6	20.8	20	12.5	11	15.3	3	12.5	40	14	
PMS behavioral symptoms	No or mild	26	89.7	107	66.8	54	75	18	75	205	72	MC P=0.454
	Moderate	2	6.9	34	21.3	12	16.7	4	16.7	52	18.2	
	Severe	1	3.4	19	11.9	6	8.3	2	8.3	28	9.8	
Total PMS score	No or mild	23	77.4	98	61.2	51	70.8	14	58.4	186	65.3	FET P=0.026*
	Moderate	5	19.2	54	33.8	17	23.6	7	29.1	83	29.1	
	Severe	1	3.4	8	5	4	5.6	3	12.5	16	5.6	
Total		29	100	160	100	72	100	24	100	285	100	

MC = Monte Carlo test, FET: fisher exact test, * significant at 0.05

percentage, arithmetic mean and standard deviation were used to describe characteristics of the students, including demographic characteristics and severity of their PMS symptoms. Fisher exact and Monte Carlo test was used to examine the relation between variables if there is small expected value. A statistically significant difference was considered at p-value $p \leq 0.05$ and a highly statistically significant difference was considered at p-value $p \leq 0.01$ while the p-value > 0.05 indicates non-significant results.

RESULTS

Table 1 shows that 43.5% of the study subjects were nursing student, while the medicine and applied medical science colleges represent 28.4% and 28.1% respectively. The largest proportion 88.4% among the study subject was single. In addition, 86% of them were rural area residence. Around half 49.5% of the study subjects have monthly income enough for living only. The mean age of the subjects was 21.88 ± 1.60 years. As regard to the BMI 56.1% of study subjects was normal body weight. According to their menstrual history, 57.9% of them have their menarche 12 to less than 15 years. Moreover, 52.6% of the study subjects have normal menstrual interval 21 to 35 days. Only 3.2% of the study

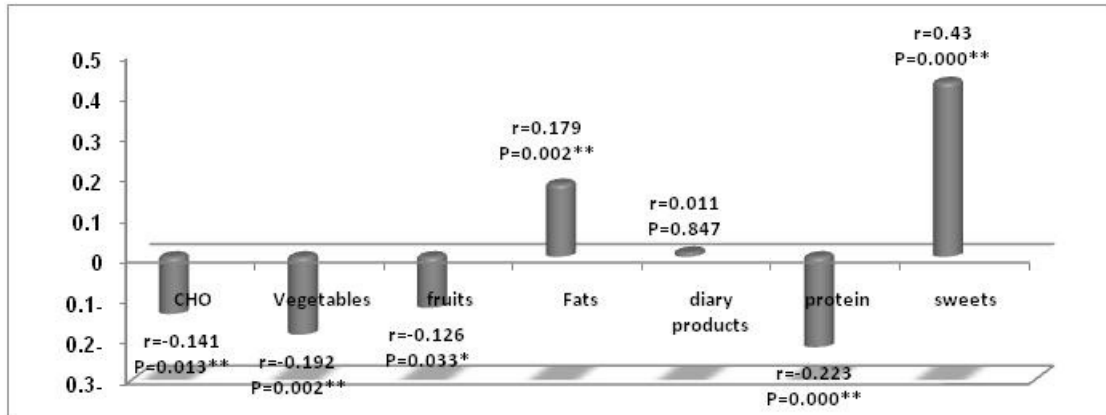
subjects have menstrual duration more than eight days.

Table 2 illustrates that 69.5% of the study subjects have no or mild PMS physical symptoms. Only 14% have the severe form of PMS psychological symptoms. Around two thirds 71.9% of the study subjects have no or mild PMS behavioral symptoms. Generally, 65.3% of the study subjects have no or mild PMS, and 5.6% have severe PMS.

Table 3 clarifies that there were a significant relationships ($P=0.007$, $P=0.037$, $P=0.026$) between BMI and severity of physical, psychological and total PMS symptoms respectively. On the other hand no significant relation ($p=0.454$) was observed between BMI and the severity of PMS behavioral symptoms.

Figure 1 shows that there were a positive, highly statistically significant correlations ($P < 0.01$) between the severity of PMS symptoms and fat and sweets consumption. On the other hand, there were a negative, highly statistically significant correlations ($P < 0.01$) between the severity of PMS symptoms and complex CHO, vegetables and protein. While the dairy products have weak correlation coefficient ($p=0.847$) with the severity of PMS symptoms.

Table 4 shows that there were a positive, highly statistically significant correlations ($P < 0.01$) between caffeine containing beverages and severity of PMS



*Correlation is statistically significant at $P \leq .05$, **Correlation is highly statistically significant at $P \leq .01$

Figure 1. Correlation coefficient between different food categories and severity of PMS symptoms among study subjects (n=285).

Table 4. Correlation coefficient between the severity of the PMS symptoms and consumptions of some drinks among study subjects (n=285).

		Caffeine containing beverage #	Packed juice	Fenugreek	Caraway	Anise	Green tea	Cinnamon	Ginger	Saffron	Peppermint	Total PMS
Caffeine containing beverage												
Packed juice	r P	0.162 0.006**										
Fenugreek	r p	0.3371 0.000**	0.090 0.130									
Caraway	r p	0.154 0.009**	0.085 0.154	0.329 0.000**								
Anise	r p	0.224 0.000**	0.015 0.800	0.296 0.000**	0.744 0.000**							
Green tea	r p	0.414 0.000**	0.185 0.002**	0.226 0.000**	0.363 0.000**	0.531 0.000**						
Cinnamon	r p	0.185 0.002**	0.48 0.422	0.209 0.000**	0.562 0.000**	0.383 0.000**	0.493 0.000**					
Ginger	r p	0.218 0.000**	0.163 0.006**	0.186 0.002**	0.524 0.000**	0.410 0.000**	0.512 0.000**	0.678 0.000**				
Saffron	r p	0.301 0.000**	0.130 0.028*	0.300 0.000**	0.498 0.000**	0.502 0.000**	0.321 0.000**	0.313 0.000**	0.391 0.000**			
Peppermint	r p	0.316 0.000**	0.029 0.627	0.336 0.000**	0.483 0.000**	0.513 0.000**	0.340 0.000**	0.298 0.000**	0.365 0.000**	0.488 0.000**		
Total PMS	r p	0.69 0.001**	0.200 0.032*	-0.214 0.000**	-192 0.048*	-189 0.042*	0.089 0.135	0.103 0.83	-0.43 0.001**	-0.63 0.000**	-0.056 0.347	

*Correlation is statistically significant at $P \leq .05$, **Correlation is highly statistically significant at $P \leq .01$. #Caffeine containing beverage (Nescafe, tea, Arabic coffee, Coca-Cola)

symptoms. Packed juice showed a positive significant correlation ($P < 0.05$) with the severity of PMS. As well as there were negative, highly statistically significant correlations ($P < 0.01$) between fenugreek, ginger, saffron and severity of PMS symptoms. Caraway and anise

showed a negative significant correlation ($P < 0.05$) with the severity of PMS. While, there were no significant correlations ($P > 0.05$) between green tea, cinnamon and the severity of PMS.

DISCUSSION

Regarding research question 1, the current study showed that around one third of the participant complained from moderate to severe PMS symptoms. The severe PMS represented only 5.6% while moderate to severe symptoms represent 34.7%. Furthermore, the severe symptoms were mainly psychological (14%), behavioral (9.8%) and lastly physical (5.6%).

The result of the present study is in line with at least other three studies. *First*, Naeimi, 2015 who studied "the prevalence and symptoms of premenstrual syndrome among female university students Baluchestan University". He reported that the severe form of PMS among his participant was only 6%. *Second*, Mahesh et al, 2011 who explored "the frequency and associated factors of PMS in medical college girls among medical students of Private Jinnah medical & dental college Karachi". They reported that 100% among his participants had reported at least one PMS symptom during the luteal phase while the psychological symptoms dominate over both behavioral and physical symptoms. *Third*, Balaha et al, 2010 who studied the "phenomenology of PMS in female medical students in King Fasil University, Kingdom Saudi Arabia" had reported that 80% among their participants has no or mild PMS, while two fifths of them had moderate to severe PMS. They also reported that psychological symptoms were the most frequently reported one.

On the other hand, a very recent study conducted by Molugulu et al, 2016 who studied "PMS among future healthcare professionals in master skill global college" reported different results. According to them, the severe and moderate form of both physical and psychological symptoms were equally represented (around 35%). Behavioral symptoms in their study represent near percentage (32%). This result doesn't give special priority in the prevalence of physical, psychological or behavioral symptoms. Moreover, Muhtaseb et al, 2015 investigated "the prevalence, severity, and impacts of PMS among female medical students at Taibah University in KAS". They reported that the prevalence of the severe PMS among their participants were much higher than the present study (56%). The difference between Muhtaseb et al. study and the current one may be attributed to the difference diagnostic criteria for PMS. Where in the present study we used premenstrual syndrome screening tool with standardized scoring system but in Muhtaseb et al's one they considered PMS as the presence of symptoms for three consecutive days or 4 days after menses.

The present study results indicated that there were a significant relationships between BMI and severity of physical, psychological and total PMS symptoms. On the other hand no significant relation was observed between BMI and the severity of PMS behavioral symptoms.

The result of the present study is supported by at least

three studies. *First*, Jahromi, 2016 who reported that adipose tissue and steroid hormones have a direct relationship with sex and steroid hormones. Thus excessive fat storage in the body is associated with disturbance of sex and steroid hormones. According to the hormonal theory, disturbance of sex and steroid hormones is strongly acknowledged as contributing factors for PMS. *Second*, Samir et al, 2015 who concluded that there's a significant relation between PMS and BMI. The severe form of PMS was prevalent among obese girls. *Third*, Bertone-Johnson et al, 2010 who reported that maintenance of normal body weight is an effective strategy in PMS management.

Contrariwise, the previously discussed Molugulu et al, 2016 study had reported no statistically significant relation between the severity of PMS and BMI among their participants. Also, an earlier study conducted by Seedhom et al, 2013 about life style factors associated with PMS " had reported no statistically significant relation between the severity of PMS and BMI among their participants.

Regarding research question 2, the present study findings demonstrated positive, highly statistically significant correlations between the severity of PMS symptoms and fat /sweets consumption. On the other hand, there were negative, highly statistically significant correlations ($P < 0.01$) between the severity of PMS symptoms and complex CHO, vegetables and protein.

The finding of the present study agrees with at least five other researches. *First*, Farasati et al, 2015 who had investigated "the relationship between western dietary pattern and PMS morbidity", they reported that the western dietary pattern which included high sweets, sugar, red meat, fast foods, fat-rich meals and fewer vegetables and fruits might be related with PMS morbidity. *Second*, Bakhshani and Hasanzadeh, 2012 who had studied "relationship of PMS and nutritional style" reported that the means of monthly vegetables and fruits consumption were significantly higher in high school students without PMS. *Third*, Oral et al, 2012 in their study about "premenstrual symptom severity, dysmenorrhea, and school performance" showed a significant relation between high consumption of vegetables and PMS reduction. *Forth*, Yen et al, 2010 who had studied "food craving among women with premenstrual dysphoric disorder, found a higher cravings for high-sweet-fat foods among women with severe form of PMS. *Fifth*, Mahmoudi et al, 2009 who had compared a 'complex carbohydrate diet and carbohydrate supplements to decrease PMS symptoms" and found that complex carbohydrate diet and carbohydrate supplements had the same reduction effect on the PMS symptoms.

On the contrary, Darabi et al, 2014 disagree with the present study result. They had studied "the relationship between PMS and food patterns". They did not find a significant relationship between bread and grain intake

and PMS symptom scores.

Based on the current study findings, there were positive, statistically significant correlations between caffeine containing beverages/Packed juice and severity of PMS symptoms. As well as there were a negative, statistically significant correlations between fenugreek, ginger, saffron, Caraway and anise consumption and severity of PMS symptoms.

This result is similar to the results of other two studies. *First*, previously mentioned Farasati et al, 2015 study, who found a significant relationship between PMS morbidity and the Western dietary pattern which mainly included caffeine-containing beverages as soft drinks. *Second*, Alhassani, 2008, who had studied "the role of dietary life style of female in alleviating pain associated with PMS", found that drinking boiled plants like, fenugreek, anise and caraway were very effective in alleviating PMS symptoms. The possible explanation for the relationship between caffeine containing beverages and severity of PMS, the consumption of coffee and caffeine may alter patterns of premenopausal estrogen metabolism according to Sisti et al, 2015. Moreover, caffeine is a stimulant and increases stress, irritability, and negative emotions.

On the other hand both Purdue-Smith et al, 2016. and Vo et al, 2010 had noted different findings. Where, *the former* had conducted "a prospective study about caffeine and coffee intake and PMS". *The latter* had studied the "effects of caffeine consumption on PMS". Both of them did not find a significant relationship between the amount of caffeine intake and PMS severity. The difference between the current study results and the latter studies might be related to the design used to evaluate the relationship of caffeine consumption and PMS. Where the latter studies were used a prospective study design while the current study was used a descriptive correlational design. Furthermore, in Saudi Arabia the Arabic coffee is consumed in large amount all over the day so the consumption of caffeine may be higher.

CONCLUSION

Based on the current study findings, and answering of research questions it can be concluded that, around one third of the medical colleges students at Najran University complained from moderate to severe PMS symptoms. There were positive, statistically significant correlations between the consumption of fats/sweets foods, caffeine containing beverages, Packed juice and the severity of PMS symptoms. Moreover, there were negative, statistically significant correlations between the consumptions of complex CHO, vegetables, protein, fenugreek, ginger, saffron, Caraway, anise and severity of PMS symptoms.

RECOMMENDATIONS

- Educational programs and seminars about PMS and its intervention strategies should be conducted at educational organizations as universities and schools.
- Educational booklets should be designed and being available in all health centers about the dietary and life style management of PMS.
- Further researches are also recommended to: Identify the relationship between water consumption and satisfaction with body weight and the severity of PMS symptoms.
- Replication of the current study on larger sample, different geographical areas in KSA

Limitation of the study

Convenience sample was used instead of random sample because of limited student number.

Conflict of interest

None.

ACKNOWLEDGEMENTS

This work was supported by a grant from Najran University.

REFERENCES

- AL Ghadeer Z A, AL Shuhayb ZS, AL luwaim F A, AL Jughaiman B A, AL Haji SH (2016). Prevalence of Premenstrual Syndrome and its Impact on the Daily Activities of Students in King Faisal University. *Int. J. Acad. Sci. Res.*; 4(4): 1-10.
- Alhassani W (2008). Role of dietary life style of female in alleviating pain associated with premenstrual syndrome. Master in Home Economics Practical Nutrition, Um-Alqura University, Kingdom of Saudi Arabia.
- AmiriFarahani L, Heidari T, Narenji F, AsghariJafarabadi M, Shirazi V (2011). Relationship between Pre Menstrual Syndrome with Body Mass Index among University Students. *Hayat.*; 17(4):85-95.
- Armand A, Talaei A (2012). Investigating the Efficacy of Cognitive-Behavioral Stress-Management Training on Decreasing the Psychological Problems and Symptoms of Premenstrual Syndrome of Afflicted Women. *Iranian Journal of Obstetrics, Gynecology & Infertility.* 15(21):24-31.
- Bakhshani NM, Hasanzadeh Z (2012). Relationship of premenstrual syndrome and nutritional style. *Med J Mashhad Uni Med Sci.* ;55(3):151-157.
- Balaha MH, Amr MA, Saleh Al Moghannum M, Saab Al Muhaidab N (2010). The phenomenology of premenstrual syndrome in female medical students: a cross sectional study. *The pan Afr. Med. J.*;5(4):298-304.
- Bertone-Johnson ER, Hankinson SE, Bendich A, Johnson SR, Willett WC, Manson JE (2005). Calcium and vitamin D intake and risk of incident premenstrual syndrome. *Arch Intern Med.*;165(11):1246-1252.

- Bertone-Johnson ER, Hankinson SE, Willett WC, Johnson SR, Manson JE (2011). Adiposity and the Development of Premenstrual Syndrome. *J Womens Health (Larchmt)*. 2010 Nov; 19(11): 1955–1962. doi: 10.1089/jwh.2010.2128.
- Biggs WS, Demuth, RH. Premenstrual syndrome and premenstrual dysphoric disorder. *American family physician*; 84 (8): 918–24.
- Chin LN, Nambiar S (2016). Management of premenstrual syndrome, Obstetrics, Gynaecology and Reproductive Medicine. article in press. <http://dx.doi.org/10.1016/j.ogrm.2016.11.003>
- Darabi F, Rasaie N, Jafarirad S (2014). The Relationship Between Premenstrual Syndrome and Food Patterns in University Student Girls. *Jentashapir J. Health Res.* December; 5(6): e26656, DOI: 10.5812/jjhr.26656
- Farasati N, Siassi F, Koohdani F, Qorbani M, Abashzadeh K, Sotoudeh G (2015). Western dietary pattern is related to premenstrual syndrome: a case-control study. *Br J Nutr.* 2015 Dec 28;114(12):2016-21. doi: 10.1017/S0007114515003943. Epub Oct 13.
- Hollins-Martin CJ, Van den Akker O, Martin CR, Preedy VR (2014). (eds). *Handbook of Diet and Nutrition in the Menstrual Cycle, Periconception and Fertility*. Wageningen Academic Publishers
- Jahromi MK (2016). Premenstrual Syndrome in Adolescents and Body Composition. *Int J AnatAppl Physiol*.;2(2e): 1-2.
- Mahesh A, Zubair SA, Tirmizi A, Ali S. Frequency And Associated Factors Of Premenstrual SYNDROME IN MEDICAL COLLEGE GIRLS. *Medial Channel J.* 2011;17(1): 34-38.
- Mahmoudi Z, Shhpourian F, Bastani F, Parsay S, Hosseini F (2009). The comparison of carbohydrate supplement and dietary carbohydrate addition on severity of premenstrual syndrome. *J Kermanshah Univ Med Sci.* 1(40):10-9.
- Masoumi SZ, Alamoti MK, Shobeiri F, Roshanaei G and Mohaghahi H (2016). Evaluating the Prevalence of Premenstrual Syndrome among Female Undergraduate Students of School of Nursing and Midwifery, Hamadan University of Medical Sciences in Iran. *Res. J. Pharma, Biol. Chem. Sci.* 7(2): 831-837.
- Molugulu N, Tumkur A, Nilugal K (2016). Study of premenstrual syndrome among future healthcare professionals in Masterskill global college. *International Journal of Pharmacy and Pharmaceutical Sciences*.;8(2):66-71.
- Muhtaseb N, Al-Raddadi A, Albukhari I, Fadi E, Alghamdi N, Fahmie M, et al. (2015). Prevalence, Severity, and Impacts of Premenstrual Syndrome among Female Medical Students at Taibah University in Saudi Arabia. *International Journal of Academic Scientific Research*.;3(4):134-142.
- Naeimi N (2015). The Prevalence and Symptoms of Premenstrual Syndrome under Examination. *Journal of Biosciences and Medicines.* 2015;3(1):1-8. doi: 10.4236/jbm..31001.
- O'Brien PM, Bäckström T, Brown C, Dennerstein L, Endicott J, Epperson CN, et al. (2011). Towards a consensus on diagnostic criteria, measurement and trial design of the premenstrual disorders: the ISPM Montreal consensus. *Arch Womens Mental Health.* 14(1):13-21.
- Oral E, Kirkan TS , Yazici E , Gulec M , Cansever Z , Aydin N (2012). Premenstrual Symptom Severity, Dysmenorrhea, and School Performance in Medical Students. *Journal of Mood Disorders,* 2(4) :143-152.
- Pitman D (2015). Nutrition's Role in Premenstrual Syndrome — Learn About This Disorder and the Role Genetics, Environment, and Diet May Play in Its Onset.. Available at <http://www.todaysdietitian.com/pdf/courses/PitmanPMScourse.pdf>
- Purdue-Smithe AC, Manson JE, Hankinson SE, Bertone-Johnson ER (2016). A prospective study of caffeine and coffee intake and premenstrual syndrome. *Am J ClinNutr.* Aug;104(2):499-507. doi: 10.3945/ajcn.115.127027. Epub 2016 Jul 6.
- Rapkin AJ, Mikacich JA (2013). Premenstrual dysphoric disorder and severe premenstrual syndrome in adolescents. *Paediatr Drugs.* Jun;15(3):191-202. doi: 10.1007/s40272-013-0018-4
- Samir N, Abd el Fattah H, Sayed EM (2015). The correlation between body mass index and menstrual profile among nursing students of Ain Shams University. *Egyptian nursing journal*; 10(1).
- Seedhom AE, Mohammed ES, Mahfouz EM (2013). Life Style Factors Associated with Premenstrual Syndrome among El-Minia University Students, Egypt. *Life Sci. J.* 10(1):1-6. <http://dx.doi.org/10.1155/2013/617123>.
- Sisti JS, Hankinson SE, Caporaso NE, Gu F, Tamimi RM, Rosner B, et al. (2015). Caffeine, coffee, and tea intake and urinary estrogens and estrogen metabolites in premenopausal women. *Cancer Epidemiol Biomarkers Prev.* 2015 Aug;24(8):1174-83. doi: 10.1158/1055-9965.EPI-15-0246. Epub Jun 10.
- Steiner M, Macdougall M, Brown E (2003). The premenstrual symptoms screening tool [PSST] for clinicians. *Arch Women Ment Health*;6(3):203-209.
- Tolossa FW, Bekele ML (2014). Prevalence, impacts and medical managements of premenstrual syndrome among female students: cross-sectional study in College of Health Sciences, Mekelle University, Mekelle, northern Ethiopia. *BMC Womens Health.* Mar 29;14:52. doi: 10.1186/1472-6874-14-52.
- Vo H, Smith B, Rubinow D (2010). Effects of Caffeine Consumption on Premenstrual Syndrome: A Prospective Study. *The Internet Journal of Endocrinology.* 6(2): 1-6.
- Yen JY, Chang SJ, Ko CH, Yen CF, Chen CS, Yeh YC, et al. (2010). The high-sweet-fat food craving among women with premenstrual dysphoric disorder: emotional response, implicit attitude and rewards sensitivity. *Psychoneuroendocrinology* 2010 Sep;35(8):1203-12. doi: 10.1016/j.psyneuen.2010.02.006. Epub Mar 11.
- Yonkers K, O'Brien PMS, Eriksson E (2008). Premenstrual syndrome. *Lancet.* Apr 5;371(9619):1200-10. doi: 10.1016/S0140-6736(08)60527-9.