Original Article / Araştırma Makalesi

THE PREVALENCE OF PREMENSTRUAL SYNDROME AMONG MIDWIFERY STUDENTS AND ITS RELATIONSHIP WITH LIFESTYLE

Ebelik Bölümü Öğrencilerinde Premenstrüel Sendrom Görülme Sıklığı ve Yaşam Tarzı ile İlişkisi

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ABSTRACT

This study was conducted to determine the prevalence of premenstrual syndrome (PMS) and its relationship with lifestyle among undergraduate midwifery students at Aydin Adnan Menderes University. 288 undergraduate female midwifery students were recruited for the study. While data on the anthropometric, socio-demographic, menstrual and lifestyle characteristics of the participants were collected by using data collection form, the premenstrual syndrome scale was utilised to determine the presence/absence of PMS in each participant. Student's T test, Mann Whitney U test, Pearson's Chi-square test, Chi-square test, Fisher's Exact test and multiple logistic regression analysis via Backward LR procedure were employed in comparing the groups with and without PMS and determining the best predicting factors for PMS. The prevalence of PMS among the participants was 51.3%. Additionally, whereas; fast-food consumption, taking vitamin /mineral supplements, poor income and expense balance, generally feeling stressed, irregular sleep and feeling pain during menstruation had a statistically significant positive relationship with PMS, consumption of white meat was found to be negatively related with PMS. A significant proportion of the study's population suffered from PMS. Therefore, more attention from healthcare providers on the subject, the incorporation of PMS-related topics into educational curricula, social support and lifestyle modifications are recommended.

Keywords: Lifestyle, Midwifery, Premenstrual syndrome, Prevalence, Student.

ÖZ

Bu çalışma, Aydın Adnan Menderes Üniversitesi ebelik lisans öğrencilerinde premenstrüel sendromun (PMS) yaygınlığını ve yaşam tarzı ile ilişkisini belirlemek amacı ile yapıldı. Çalışmaya ebelik bölümünden 288 kadın lisans öğrencisi dâhil edildi. Katılımcıların antropometrik, sosyo-demografik, menstrüel ve yaşam tarzı özellikleri ile ilgili veriler veri toplama formu kullanılarak toplanırken, her katılımcıda PMS olup olmadığını belirlemek için premenstrüel sendrom ölçeği kullanıldı. PMS olan ve olmayan grupların karşılaştırılmasında ve PMS'yi en iyi öngören faktörlerin belirlenmesinde; Student's T testi, Mann Whitney U testi, Pearson'un Ki-kare testi, Ki-kare testi, Fisher'ın kesin sonuçlu olasılık testi ve çoklu değişkenli geriye dönük adımsal elemeli lojistik regresyon analizi kullanıldı. Katılımcılar arasında PMS prevalansı %51.3 idi. Ayrıca; fast-food tüketimi, vitamin/mineral takviyesi alma, gelir-gider dengesinin kötü olması, genel olarak stresli hissetme, düzensiz uyku ve adet döneminde ağrı hissetme PMS ile istatistiksel olarak anlamlı pozitif ilişki gösterirken, beyaz et tüketiminin PMS ile negatif ilişkili olduğu bulundu. Çalışma popülasyonunun önemli bir bölümü PMS'den muzdaripti. Bu nedenle, sağlık hizmeti verenlerin konuya daha fazla dikkat etmesi, PMS ile ilgili konuların eğitim müfredatına dâhil edilmesi, sosyal destek ve yaşam tarzı değişiklikleri önerilmektedir.

Anahtar kelimeler: Ebelik, Öğrenci, Premenstrüel sendrom, Prevalans, Yaşam tarzı.

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INTRODUCTION

Tıbbi Women of child-bearing age all over the world experience menstruation, which involves the desquamation of the endometrium, approximately once in a month as a marker of their fertility. About 80% of women report symptoms related to the premenstrual period, and a proportion of such women are eventually diagnosed with premenstrual syndrome (PMS) (O'Brien et al., 2011). PMS is defined as constellation of somatic and psychological symptoms that manifest during the luteal phase of the menstrual cycle, which resolve with the onset of menstruation, and interfere with an individual's life (O'Brien et al., 2011; World Health Organisation [WHO], 2022).

The worldwide prevalence of PMS among menstruating women reported in the most recent meta-analysis, although relatively outdated compared to the time the present study was conducted, is 48% (Direkvand-Moghadam, Sayehmiri, Delpisheh & Satar, 2014). The prevalence for Turkey reported in the afore-mentioned study as 50% is consistent with the reports (Kahyaoglu Sut & Mestogullari, 2016; Pinar & Oncel, 2011; Yilmaz-Akyuz & Aydin-Kartal, 2019). Moreover, a recent systematic review and meta-analysis pooling the national prevalence of PMS across Turkey reports a prevalence of 52.2% in Turkey (Erbil & Yücesoy, 2023).

Factors found to be associated with PMS are mainly lifestyle factors and include smoking, alcohol consumption, physical activity, yoga, caffeine consumption, stress, vitamin and mineral intake, sleep and nutrition (Abeje & Berhanu, 2019; Bertone-Johnson et al., 2005; Bertone-Johnson, Hankinson, Johnson & Manson, 2008, 2009; Cheng et al., 2013; Chocano-Bedoya et al., 2011, 2013; Christy, Zeina, Safaa & Shafika, 2018; del Mar Fernández, Regueira-Méndez & Takkouche, 2019; Houghton et al., 2019; Kroll-Desrosiers et al., 2017; Mohebbi Dehnavi, Jafarnejad & Sadeghi Goghary, 2018; Munishwar & Mishra, 2019; Perry, Judge, Millar & McDonald, 2015; Pinar & Oncel, 2011; Rad, Sabzevary & Dehnavi, 2018; Rupa Vani, Veena, Subitha, Hemanth Kumar & Bupathy, 2013; Seedhom, Mohammed & Mahfouz, 2013; Tarı Selçuk, Avcı & Alp Yılmaz, 2014; Tsai, 2016; Tschudin, Bertea & Zemp, 2010; Yamamoto, Okazaki, Sakamoto & Funatsu, 2009; Yilmaz-Akyuz & Aydin-Kartal, 2019). Nonetheless, risk factors related to socio-demographic and menstrual characteristics have been reported as well. These include age, employment status, educational status, living area, marital status, parity, body mass index (BMI), age at menarche, maternal/family history of PMS, length of menstrual cycle, dysmenorrhoea, length of menstrual flow and amount of menstrual flow (Abeje & Berhanu, 2019; A. Arafa, Mahmoud, Abu Salem & Mohamed, 2020; Bertone-Johnson,

Hankinson, Willett, Johnson & Manson, 2010; del Mar Fernández et al., 2019; ELBanna, ELBbandrawy, Elhosary & Gabr, 2019; Kroll-Desrosiers et al., 2017; Oraby, Fawaz & El-Sharkawy, 2016; Pinar & Oncel, 2011; Rad et al., 2018; Seedhom et al., 2013; Tschudin et al., 2010; Yamamoto et al., 2009).

The aetiology of PMS is barely understood. However, many studies have shown a strong association between the symptoms of PMS and the cyclic changes in oestrogen and progesterone levels (Hofmeister & Bodden, 2016). It has also been shown that there is a requirement of ovarian activity and probably ovulation for the manifestation of premenstrual symptoms (O'Brien et al., 2011). The effect of oestrogen and progesterone on serotonin, γ-aminobutyric acid, and dopamine probably explains the mood related symptoms of PMS. These in turn affect the renin-angiotensin-aldosterone system which may also be the reason for bloating and swelling that occur during the luteal phase (Hofmeister & Bodden, 2016). Anxiety/tension, mood swings, appetite changes/food cravings, cramps, decreased interest in activities, difficulties in concentrating, irritability, abdominal bloating, breast tenderness, crying spells, insomnia, headache, migraine, back joint, muscle pains, discomfort and pain in the abdomen, fatigue, atypical depressive characteristics, hostility/anger and deterioration in social functionality are among the wide range of symptoms reported to be associated with PMS (Freeman et al., 2011; Nworie, Aluh & Onyekwum, 2018; Pinar & Oncel, 2011).

In the diagnosis of PMS, it is essential for symptoms to occur during all or part of the 2-week luteal phase and resolve during or shortly after menstruation (O'Brien et al., 2011). Additionally, symptoms should not be an exacerbation of an underlying disorder since certain ailments such as diabetes, migraine, epilepsy, asthma, and depression or other mental disorders, although existent throughout the entire menstrual cycle, could intensify during the luteal phase (Hofmeister & Bodden, 2016; O'Brien et al., 2011). Attention should be paid to the possible presence of independent co-morbidities such as migraine, anaemia, endometriosis and hypothyroidism which exhibit symptoms similar to those of PMS (Hofmeister & Bodden, 2016; O'Brien et al., 2011). According to the American College of Obstetricians and Gynecologists (ACOG) diagnostic criteria, if the patient reports at least one each of the defined affective symptoms (angry outbursts, anxiety, confusion, depression, irritability and social withdrawal) and somatic symptoms (abdominal bloating, breast tenderness and swelling, headache, joint or muscle pain, swelling of extremities and weight gain) during the five days before menstruation in each of the three previous menstrual cycles, they have PMS (Hofmeister & Bodden, 2016).

Having a prevalence of such a significant degree, PMS is truly a global health issue among women all over the world, and various attempts to manage the situation has resulted in an expanding body of evidence of the association of PMS with lifestyle. Consequently, while treatment options such as selective serotonin reuptake inhibitors, oral contraceptives and gonadotropin-releasing hormone agonists have been traditionally recommended for the management of PMS, the focus has recently gradually shifted from medical/surgical interventions to lifestyle modifications (Hofmeister & Bodden, 2016). A growing demand on the knowledge about which lifestyle factors are evidently related with PMS development and its occurrence as well as their mechanisms has led to the need for more studies that examine and confirm the potential relationship between PMS and lifestyle choices. In view of this, the present study was carried out with the aim of determining the prevalence of PMS and its relationship with lifestyle among the midwifery students of the Faculty of Health Sciences of Aydin Adnan Menderes University.

MATERIALS AND METHOD

Objective and Type

The research was an analytic and cross-sectional study conducted between October 2019 and August 2020 with the aim of determining the prevalence of PMS and its relationship with lifestyle among the midwifery students of the Faculty of Health Sciences of Aydin Adnan Menderes University.

Population and Sample

The population of the research comprised undergraduate female students in the Midwifery Department of Aydin Adnan Menderes University (N=377). Although the entire population was included in the study in order to increase its strength, the sample size amounted to 228 students after collection of data and application of both inclusion criteria (volunteering to participate in the research, studying at the Midwifery Department of Aydın Adnan Menderes University Faculty of Health Sciences and being a female) and exclusion criteria (not having any mental disorder, not using any anti-depressants and not using combined oral contraceptives).

Collection and Analysis of Data

Data on the anthropometric, socio-demographic, menstrual and lifestyle characteristics of the participants were collected using a data collection form developed by the researchers based on another study (del Mar Fernández et al., 2019). The premenstrual syndrome scale (PMSS)

was utilised to determine the presence/absence of PMS in each participant. Student's T test, Mann Whitney U test, Pearson's Chi-square test, Chi-square test, Fisher's Exact test and multiple logistic regression analysis via Backward LR procedure were employed in comparing the groups with and without PMS and determining the best predicting factors for PMS.

Premenstrual Syndrome Scale (PMSS)

The PMSS is a 44-item 5-point Likert type scale developed by Başaran Gençdoğan that measures the severity of premenstrual symptoms (Gençdoğan, 2006). The PMSS consists of items/statements describing the symptoms of PMS under 9 main sub-sections; firstly, depressive feelings, then anxiety, fatigue, nervousness, depressive thoughts, pain, changes in appetite, changes in sleep pattern, and lastly bloating. The total PMSS score is obtained by adding up the sum-scores of each sub-section. The minimum total score that may be obtained from this scale is 44 points whereas the maximum total score is 220 points. A total score of 132 points (50%) and above indicates the presence of PMS. For a more detailed diagnosis: a score of 44 points indicates the absence of PMS, a score of 45-103 points indicates mild PMS, a score of 104-163 points indicates moderate PMS, and a score of 164-220 points indicates severe PMS.

Limitations

Recall bias could affect accurate recollection of symptom experience. Moreover, the fact that symptoms were self-reported could lead to either over-estimation or under-estimation of the severity of symptoms depending on how the participant perceived it. Another weakness of this study is that it was conducted on a student population which may have different features compared to the general population. This implies that the result may not be liberally generalised to the general population as would easily be in the case of a population-based study.

Ethics

Written permission was obtained from the Faculty of Health Sciences, Aydin Adnan Menderes University for the implementation of the research. The research protocol was approved by the Ethics Committee of the Faculty of Health Sciences Clinical Research Advisory Commission (29/08/2020-E.44527).

RESULTS

Descriptive statistics on the socio-demographic characteristics, the menstrual characteristics as well as the descriptive statistics in terms of the risk factors related to PMS are shown in Table 1, Table 2, and Table 3 respectively.

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Table 1. Socio-Demographic Characteristics of the Participants of the Study

Characteristic (n=228)	mean±SD
Age (years)	20.1±1.3
Body weight (kg)	59.0±10.9
Height (m)	1.63±0.063
Body mass index (kg / m^2)	22.2±4.24
Characteristic (n=228)	**n (%)**
Class	
1st year	65 (28.5%)
2nd year	58 (25.4%)
3rd year	61 (26.8%)
4th year	44 (19.3%)
Employment status	8 (3.5%)
Income level of family	
Income > expenditure	18 (7.9%)
Income = expenditure	88 (38.6%)
Income < expenditure	122 (53.5%)
Having health insurance	182 (79.8%)
Family type	
Nuclear	206 (90.4%)
Extended	19 (8.3%)
Broken	3 (1.3%)
Living area (where the participant has lived longest)	
Urban	91 (39.9%)
Suburban	78 (34.2%)
Rural	59 (25.9%)
Marital status	
Married	4 (1.8%)
Single	224 (98.2%)

Table 2. Menstrual Characteristics of the Participants Included in the Study

Characteristic (n=228)	median (min– max)
Age at menarche (years)	13 (10-15)
Length of cycle (days)	28 (18-50)
Length of flow (days)	6 (2-8)
Characteristic (n=228)	**n (%)**
Regular cycle	
Yes	195 (85.5%)
No	33 (14.5%)
Menstrual pain	
Yes	168 (73.7%)
No	60 (26.3%)
Use of analgesics for Menstrual Pain	
Yes	90 (39.5%)
No	138 (60.5%)

Table 3. Risk Factors Related to PMS of the Participants of the Study

Characteristic (n=228)	n (%)
Currently smoking	
No	186 (81.6%)
Yes	42 (18.4%)
Alcohol use	
No	189 (82.9%)
Yes	39 (17.1%)
Physical activities	
No	169 (74.1%)
Yes	59 (25.9%)
Yoga / Meditation	
No	221 (96.9%)
Yes	7 (3.1%)

Characteristic (n=228)	median(min-max)
Frequency of smoking (pieces / day)	7 (1-20)
Frequency of physical exercise (times / week)	4 (1-7)
Frequency of alcohol consumption (times/week)	1(1-7)
Frequency of yoga/meditation (times / week)	1 (1-4)
Coffee consumption (cups / day)	1 (0-6)
Tea consumption (cups / day)	2 (0-10)
Frequency of water intake (glasses (200ml) / day)	7 (2-16)

Characteristic (n=228)	n (%)
Adding extra salt before tasting	
Yes	61 (26.8%)
No	167 (73.2%)
Type of drinking water	
Mains water	23 (10.1%)
Commercially sold water	159 (69.7%)
Mineral water	19 (8.3%)
Water obtained by purification device	55 (24.1%)
Premenstrual complaint in mother or sister	
Yes	115 (50.4%)
No	113 (49.6%)
Inability to control anger sometimes	
Yes	203 (89.0%)
No	25 (11.0%)
When anger is especially uncontrollable	
Before menstruation	139 (68.5%)
During menstruation	46 (22.6%)
Always	18 (8.9%)
Generally feeling stressed	
Yes	150 (65.8%)
No	78 (34.2%)
Areas affected by menstrual discomforts	
Academic	108 (47.4%)
Social	158 (69.3%)
Professional	26 (11.4%)
Family / home life	66 (28.9%)
Presence of chronic disease	17 (7.5%)
Constant medication	13 (5.7%)
Use of contraceptive method	6 (2.6%)
Vitamin / mineral supplement	31 (13.6%)
Sleep pattern	
Regular sleep	107 (46.9%)
Irregular sleep	121 (53.1%)

The mean PMSS score of the participants was 131.6 ± 35.98 and PMSS scores ranged from 44 to 220. According to the 132-cut-off point, 111 (48.7%) participants were PMS negative while 117 (51.3%) were PMS positive. All variables determined as $p < 0.10$ as a result of univariate statistical analyses (Table 4, Table 5, Table 6) were included in the multivariate logistic regression model as candidate factors. When other possible factors were adjusted for, it was observed that fast food consumption triggered PMS development, and this was statistically significant (OR = 3.291; 95% CI: 1.881-5.755 and $p < 0.001$). The probability of PMS occurrence among participants taking vitamin/mineral supplement was statistically significant 6,832 times (95% CI: 2.256-20.688) ($p < 0.001$). While the odds of PMS occurrence significantly increased by 6.994 times (95% CI: 1.396-35.048) among those whose family income equated expenditure (income = expenditure) as compared to those whose family income was higher than expenditure (income > expenditure) ($p = 0.018$); the odds of PMS occurrence among those with family income less than expenditure (income<expenditure) increased by 11.725 times (95% CI: 2.417-56.877) ($p=0.002$). Furthermore, generally feeling stressed significantly increased the odds of PMS occurrence by 2.892 times (95% CI: 1.466-5.707) ($p=0.002$). Regardless of other factors, the incidence of PMS decreased significantly as white meat consumption increased (OR=0.431; 95% CI: 0.240-0.776 and $p=0.005$). Additionally, the odds of PMS occurrence when other factors were adjusted for significantly increased for irregular sleep (OR=2.092; 95% CI: 1.096-3.991 and $p=0.025$) as well as for pain during menstruation (OR=2.185; 95% CI: 1.044-4.574 and $p =0.038$).

Table 4. Socio-Demographic and Menstrual Characteristics of the Participants in the Groups

Characteristic (n=228)	Without PMS (n=111)	With PMS (n=117)	p-value
Age (years, mean±SD)	20.2±1.3	19.9±1.3	0.079†
Body mass index (kg/m², mean±SD)	22.1±4.5	22.3±4.0	0.837†
Age at menarche (years, median (min-max))	13 (10-15)	13 (10-15)	0.363¶
Length of cycle (days, median (min-max))	28 (18-45)	28 (21-50)	0.259¶
Length of flow (days, median (min-max))	6 (2-8)	6 (2-8)	0.865¶
Regular cycle			
Yes	96 (86.5%)	99 (84.6%)	0.831$
No	15 (13.5%)	18 (15.4%)	
Menstrual pain			
Yes	76 (68.5%)	92 (78.6%)	0.082‡
No	35 (31.5%)	25 (21.4%)	
Use of analgesics for Menstrual Pain			
Yes	39 (35.1%)	51 (%43.6)	0.192‡
No	72 (64.9%)	66 (56.4%)	
Income level of family			
Income > expenditure n(%)	15 (13.5%)	3 (2.6%)	<0.001‡
Income = expenditure	48 (43.2%)	40 (34.2%)	
Income < expenditure	48 (43.2%)	74 (63.2%)	

† Student's t test, ‡ Pearson's χ^2 test, ¶ Mann Whitney U test, $ Continuity correction χ2 test.

Table 5. Distribution in Terms of Risk Factors Related to PMS in the Groups (N=228)

Characteristic	Without PMS (n=111)	With PMS (n=117)	p-value
Currently smoking			
No	94 (84.7%)	92 (78.6%)	0.314†
Yes	17 (15.3%)	25 (21.4%)	
Frequency of smoking (median (min - max))	7 (3-20)	7 (1-20)	0.688‡
Alcohol use			
No	98 (88.3%)	91 (77.8%)	0.054†
Yes	13 (11.7%)	26 (22.2%)	
Frequency of alcohol intake (median (min-max))	1 (1-4)	1 (1-7)	0.670‡
Physical activities			
No	82 (73.9%)	87 (74.4%)	0.933¶
Yes	29 (26.1%)	30 (25.6%)	
Frequency of physical exercise (median (min-max))	4 (1-7)	4 (1-7)	0.517‡
Yoga / Meditation			
No	109 (98.2%)	112 (95.7%)	0.447$
Yes	2 (1.8%)	5 (4.3%)	
Frequency of yoga/meditation (median (min - max))	3 (2-4)	1 (1-3)	0.190‡
Coffee consumption (median (min - max))	1 (0-6)	1 (0-6)	0.968‡
Tea consumption (median (min - max))	2 (0-6)	1.5 (0-10)	0.301‡
Adding extra salt before tasting			
Yes	35 (31.5%)	26 (22.2%)	0.112¶
No	76 (68.5%)	91 (77.8%)	
Daily water intake (median (min - max))	7 (3-16)	7 (2-15)	**0.049‡**
Type of drinking water			
Mains water	9 (8.1%)	14 (12.0%)	0.455†
Commercially sold water	72 (64.9%)	87 (74.4%)	0.119¶
Mineral water	9 (8.1%)	10 (8.5%)	>0.999†
Water obtained by purification device	27 (24.3%)	28 (23.9%)	0.945†
Premenstrual complaint in mother or sister			
Yes	55 (49.5%)	60 (51.3%)	0.794¶
No	56 (50.5%)	57 (48.7%)	
Inability to control anger sometimes			
Yes	93 (83.8%)	110 (94.0%)	0.024†
No	18 (16.2%)	7 (6.0%)	
When anger is especially uncontrollable			
Before menstruation	63 (67.7%)	76 (69.1%)	
During menstruation	23 (24.7%)	23 (20.9%)	0.710¶
Always	7 (7.5%)	11 (10.0%)	
Generally feeling stressed			
Yes	59 (53.2%)	91 (77.8%)	<0.001¶
No	52 (46.8%)	26 (22.2%)	
Areas affected by menstrual discomforts			
Academic	52 (46.8%)	56 (47.9%)	0.878¶
Social	65 (58.6%)	93 (79.5%)	**<0.001¶**
Professional	13 (11.7%)	13 (11.1%)	>0.999†
Family / home life	32 (28.8%)	34 (29.1%)	0.969¶
Presence of a chronic disease	5 (4.5%)	12 (10.3%)	0.161†
Constant medication	4 (3.6%)	9 (7.7%)	0.296†
Use of contraceptive method	1 (0.9%)	5 (4.3%)	0.214$
Vitamin / mineral supplement	9 (8.1%)	22 (18.8%)	**0.031†**
Sleep pattern			
Regular sleep	62 (55.9%)	45 (38.5%)	0.009¶
Irregular sleep	49 (44.1%)	72 (61.5%)	

† Continuity corrected $\chi 2$ test, ‡ Mann Whitney U test, ¶ Pearson's $\chi 2$ test, $ Fisher's exact probability test.

Table 6. Distribution in Terms of Nutritional Habits in the Groups (n=228)

Nutritional Group	Without PMS (n=111)	With PMS (n=117)	p-value †
Dairy products			
Never	1 (0.9%)	0 (0.0%)	
1-2 times / month	4 (3.6%)	4 (3.4%)	0.970
1-2 times / week	29 (26.1%)	32 (27.4%)	
At least once / day	77 (69.4%)	81 (69.2%)	
Red meat			
Never	6 (5.4%)	11 (9.4%)	
1-2 times / month	42 (37.8%)	60 (51.3%)	**0.009**
1-2 times / week	59 (53.2%)	43 (%36.8)	
At least once / day	4 (3.6%)	3 (2.6%)	
White meat			
Never	1 (0.9%)	6 (%5.1)	
1-2 times / month	21 (18.9%)	32 (27.4%)	**0.012**
1-2 times / week	82 (73.9%)	76 (65.0%)	
At least once / day	7 (6.3%)	3 (2.6%)	
Sea food			
Never	11 (9.9%)	11 (9.4%)	
1-2 times / month	77 (69.4%)	83 (70.9%)	0.951
1-2 times / week	23 (20.7%)	22 (18.8%)	
At least once / day	0 (0.0%)	1 (0.9%)	
Vegetables and fruits			
Never	0 (0.0%)	3 (2.6%)	
1-2 times / month	9 (8.1%)	8 (6.8%)	0.819
1-2 times / week	49 (44.1%)	47 (40.2%)	
At least once / day	53 (47.7%)	59 (50.4%)	
Fast-food			
Never	2 (1.8%)	2 (1.7%)	
1-2 times / month	70 (63.1%)	42 (35.9%)	**<0.001**
1-2 times / week	37 (33.3%)	60 (51.3%)	
At least once / day	2 (1.8%)	13 (11.1%)	
Salami and sausages			
Never	14 (12.6%)	8 (6.8%)	
1-2 times / month	52 (46.8%)	53 (45.3%)	0.165
1-2 times / week	43 (38.7%)	54 (46.2%)	
At least once / day	2 (1.8%)	2 (1.7%)	
Bakeries and pastries			
Never	0 (0.0%)	0 (0.0%)	
1-2 times / month	23 (20.7%)	17 (14.5%)	0.235
1-2 times / week	64 (57.7%)	70 (59.8%)	
At least once / day	24 (21.6%)	30 (25.6%)	
Dessert			
Never	1 (0.9%)	1 (0.9%)	
1-2 times / month	23 (20.7%)	26 (22.2%)	0.884
1-2 times / week	74 (66.7%)	73 (62.4%)	
At least once / day	13 (11.7%)	17 (14.5%)	
Carbonated and/ or sugary drinks			
Never	9 (8.1%)	8 (6.8%)	
1-2 times / month	40 (36.0%)	28 (23.9%)	**0.048**
1-2 times / week	50 (45.0%)	63 (53.8%)	
At least once / day	12 (10.8%)	18 (15.4%)	

† Mann Whitney U test

DISCUSSION

The prevalence of PMS (51.3%) found in this study using the PMSS is consistent with the prevalence reported by other studies conducted both in Turkey and in other countries. A meta-analysis reviewing the prevalence of PMS, reported a global PMS prevalence of 47.8% as well as a national prevalence of 50% for Turkey (Direkvand-Moghadam et al., 2014). The authors admit that this source is relatively outdated, however, it is the most recent study evaluating the global prevalence of PMS. Immediate update on the global prevalence of PMS is deemed necessary. The most recent systematic review and meta-analysis pooling the national prevalence of PMS reports a prevalence of 52.2% across Turkey which is comparable to the prevalence found in the present study (Erbil & Yücesoy, 2023). Moreover, in a local study including 184 students in Turkey, the prevalence of PMS was found to be 50.2% using the PMSS (Tarı Selçuk et al., 2014). Another local study using the PMSS also reported a prevalence of 43.8% among 426 students (Yilmaz-Akyuz & Aydin-Kartal, 2019). Nworie et al. (2018), in addition, reported a prevalence of 47.6% among 480 students in Nigeria using the Calendar of Premenstrual Experiences.

On the contrary, the obtained prevalence is inconsistent with some other studies. Using the Premenstrual Screening Tool, a prevalence of 10.3% was obtained for 3522 Swiss women in a population-based study (Tschudin et al., 2010). This low figure could be attributed to the use of a modified version of the Premenstrual Screening Tool, and also to the large sample size. Another study reported a prevalence of 32% among 305 female students in Bulgaria having used the DSM-IV as diagnostic tool (Chumpalova et al., 2020). The lower prevalence obtained in the previously mentioned study compared to what was obtained in the present study could be explained as being due to the use of the DSM-IV diagnostic tool which is considered to consist of stringent criteria thereby usually yielding a lower percentage for prevalence (O'Brien et al., 2011). Also, using the PMSS as a diagnostic tool, Sut and Mestogullari (2011) obtained a prevalence of 38.1%, and this variation in prevalence could be potentially due to the fact that the study population consisted of practising nurses who may have a healthier lifestyle in general due to their knowledge in health (Kahyaoglu Sut & Mestogullari, 2016). Insincere reporting due to a socio-cultural background which considers discussing PMS and its related topics a taboo is a potential reason for a lower prevalence of 35.3% reported by a study consisting of 300 students in UAE (Hashim et al., 2019). Some studies, on the other hand, using the ACOG criteria as a diagnostic tool have reported a higher prevalence probably attributable to the use of the ACOG criteria since, unlike the DSM-IV, the ACOG criteria is deemed rather liberal and

results in higher rates of PMS when used (Abeje & Berhanu, 2019; Christy et al., 2018; O'Brien et al., 2011). Also, a higher prevalence is possibly as a result of younger population as could be the case of Abeje and Berhanu (2019) who reported a mean age of 13.23 ± 1.47 years.

Factors Related to PMS

PMS was positively associated with taking vitamin /mineral supplements, poor income and expense balance, generally feeling stressed, irregular sleep, feeling pain during menstruation and the consumption of fast-food but negatively associated with white meat consumption according to the results of the present study. Inability to sometimes control anger, the amount of daily water intake and the consumption of red meat and carbonated drinks were no longer significantly associated with PMS after multiple logistic regression analyses.

Women use vitamin/mineral supplements for various reasons such as for prophylactic purposes, cosmetic purposes, and treatment purposes. The use of vitamins/minerals (vitamins, calcium - vitamin D, zinc, and magnesium) was found among 13.74% of the study's participants. Interestingly, this was found to be positively associated with PMS. This finding is consistent with the findings of one study which established a linear relationship between PMS development and supplemental intakes of B vitamins specifically; thiamine, riboflavin, niacin, vitamin B-6, folate, and vitamin B-12 in their prospective study among American nurses (Chocano-Bedoya et al., 2011). Supplementary vitamin and mineral intake are thought to function as a consequence of already existent PMS as some PMS patients and doctors consider supplementary vitamin and mineral intake as a preventive measure against episodes of PMS (Chocano-Bedoya et al., 2011). Another study, however, reported that there was no significant association between the supplementary intakes of minerals (iron, zinc, magnesium, copper, potassium, and manganese) and the development of PMS (Chocano-Bedoya et al., 2013). Moreover, some studies have reported a negative association of calcium - vitamin D with the occurrence of PMS (Bertone-Johnson et al., 2005; Kroll-Desrosiers et al., 2017). Inconsistencies among studies may be due to fewer number of participants using supplementary vitamin and minerals and also the analysis of all vitamins and minerals as one factor without detailed analysis.

In the present study, poor income-expenditure balance was found to be positively associated with PMS. This is in agreement with Costanian et al. (2018) who indicated that PMS was significantly positively related with father's income level. Another study conducted using an artificial neural network (ANN) model to determine the factors associated with PMS reported the economic status of students to be an influential factor on PMS (Aksoy Derya et al.,

2020). To the authors' knowledge, there has not been any in-depth study on the association between income level and the occurrence of PMS. The few studies that casually examined this relationship between PMS and income level alongside other factors reported a null significant association (Faramarzi, Kheirkhah & Azadfrouz, 2014; Pinar & Oncel, 2011; Rad et al., 2018). Many studies have demonstrated the strong relationship between socio-economic level and health with lifestyle as a mediator (Wang & Geng, 2019). The association reported in the present study is attributable to the fact that insufficient income level adversely affects the lifestyle choices of the individual which in turn increases the risk for PMS.

The state of generally feeling stressed was determined as a predicting factor for PMS. One study established high perceived stress as a causative/contributing factor that increased the number of symptoms and severity of PMS (Gollenberg et al., 2010). More studies have contributed to this evidence by indicating that psychosocial stress has a significant effect on the development of PMS (del Mar Fernández et al., 2019; Yamamoto et al., 2009). Stress is thought to be both a causative and consequent factor; whereas the anticipation and experience of other PMS symptoms could function as a stressor and result in stress, it has been hypothesised, on the other hand, that hypothalamic-pituitary-adrenal (HPA) activation axis due to stress resulting in hypothalamic-pituitary-gonadal (HPG) axis inhibition contributes to the development of problems related to menstruation together with the mechanisms of corticotrophin-releasing hormone (CRH), vasopressin, and endogenous opioid peptides (Yamamoto et al., 2009).

Various studies have established that sleep disorders - such as insomnia, and its pointers – such as the use of sleeping pills, are linearly associated with the occurrence of PMS (A. Arafa et al., 2020; Cheng et al., 2013; Christy et al., 2018). This is consistent with the findings of the present study according to which irregular sleep was found to be positively associated with PMS. The relationship between irregular sleep and PMS is believed to be bidirectional seeing as, on the one hand, there is a possibility for a woman with PMS to experience poor quality of sleep due to the PMS physiopathology and symptoms such as pain, anxiety and changes in appetite; and on the other hand, irregular sleep may interfere with the normal functioning of the body resulting either directly in the development of PMS or indirectly by leading to other established factors related to PMS such as obesity and stress (Medic, Wille & Hemels, 2017)

A rather unignorably large proportion (73.7%) of the current study's sample reported experiencing menstrual pain, and this was significantly linearly correlated with the occurrence of PMS. The strong association between PMS and dysmenorrhoea has been reported by several studies (A. E. Arafa, Senosy, Helmy & Mohamed, 2018; Oraby et al., 2016; Yamamoto et al.,

2009). It has been suggested that similarities in symptoms for both PMS and dysmenorrhoea, PMS symptoms overlapping into the menstrual phase and similar management and interventions for both PMS and dysmenorrhoea could account for this association (Booton & Seideman, 1989). The result obtained in the present study contradicts the result obtained by another author (Rupani & Lema, 1993). This variation is thought to be due to differences in diagnosis criteria and social-cultural background as the topic of menstruation is considered a taboo in certain cultures causing some participants to not sincerely report symptoms.

Similar to the findings of other studies, fast-food consumption increased the risk for PMS by 3.3 times according to the results of the present study (Cheng et al., 2013; Hashim et al., 2019; Rad et al., 2018; Rupani & Lema, 1993; Seedhom et al., 2013; Tarı Selçuk et al., 2014). Rupa Vani et al. (2013) speculated that high amounts of saturated fatty acids contained in fast-foods contain may interfere with progesterone metabolism during the luteal phase and cause PMS (Rupa Vani et al., 2013). Moreover, lack of micronutrients in fast-food could explain the association between fast-food consumption and PMS since fast-foods contain minimal micronutrients and some studies have established a positive correlation between PMS and low intake of micronutrients such as calcium, vitamin D, iron, thiamine and riboflavin (Bertone-Johnson et al., 2005; Chocano-Bedoya et al., 2011, 2013; Kroll-Desrosiers et al., 2017). The findings of the present study regarding fast-food consumption disagree with one study and this could be due to variations in the tools used to measure fast food intake frequency and PMS (U.S. Department of Agriculture, 2020).

An interesting finding of the current study was a negative association of PMS with white meat consumption. It is believed that relatively less saturated fatty acid content in white meat particularly the lean portion reduces interference with progesterone mechanism during the luteal phase leading to less risk of PMS (Rupa Vani et al., 2013; U.S. Department of Agriculture, 2020). Although the vitamin and mineral content of white meat may not be as high as that of red meat, fruits and vegetables, the moderate amount present in white meat in combination with other mechanisms such as possible reduced interference with progesterone is believed to positively impact the occurrence of PMS (U.S. Department of Agriculture, 2020). Very few studies have examined the relationship between white meat consumption and the occurrence of PMS. One study reported that while there was no association between PMS risk and total protein in general, there was an inverse association between PMS risk and the consumption of animal protein among younger participants. Furthermore, PMS was not associated with salty-fatty food consumption which included chicken in another study

(Mohamadirizi & Kordi, 2015). The variation in findings may be potentially due to the examination of factors including sources of white meat instead of only white meat as a factor as is the case of the present study. Future prospective and longitudinal studies are necessary as the mechanism for this association is very unclear.

CONCLUSION

In conclusion, a significant proportion of the study's population suffered from PMS, which implies more than half of the students had their lives interfered by PMS. Therefore, it is recommended that healthcare workers including midwives pay attention to the subject of PMS especially in diagnosing and managing its occurrence. Additionally, PMS-related topics should be incorporated into educational curricula and support groups should be formed to constitute more awareness about PMS. Furthermore, lifestyle modifications such as reducing fast-food consumption and stress, improving sleep quality and giving preference to white meat consumption could decrease the development and severity of PMS.

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