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Evaluation of Premenstrual Syndrome Symptoms, Dietary Habits and Emotional Eating Behaviors Among 18-49 Years of Aged Women

18-49 Yaş Arası Kadınlarda Premenstrual Sendrom Semptomlarının, Beslenme Alışkanlıklarının ve Duygusal Yeme Davranışının Değerlendirilmesi

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**This study was carried out within the scope of Ebru Altun's master's thesis.*

ABSTRACT

Aim: *Premenstrual syndrome (PMS) is a common disorder and PMS is characterized by behavioral, mental, and physical symptoms that can impair the quality of life. This study aimed to assess the relationship between PMS symptoms, dietary habits, and emotional eating behaviors.*

Material and Method: *The sociodemographic, anthropometric, menstrual characteristics, and dietary habits of 462 women aged 18-49 were evaluated and the Premenstrual Syndrome Scale (PMSS), Mediterranean Diet Adherence Scale (MEDAS), and Emotional Eating Scale (EES) were applied.*

Results: *PMS was detected in 66.9% of women (n=309). Women with PMS had higher PMSS sub-scales, total scores, and EES scores than women without PMS ($p<0.05$), while MEDAS scores did not differ between the groups ($p=0.841$). A positive correlation between PMSS total and EES scores ($r=0.257$, $p<0.001$), and a negative correlation between MEDAS and EES scores ($r=-0.090$, $p=0.007$) were detected. The frequency of consumption of refined grains, coffee, packaged products, and beverages was higher in women with PMS during the premenstrual period ($p<0.05$).*

Conclusion: *There is a relationship between PMS and emotional eating, and foods that do not comply with healthy eating habits are preferred. The study suggests increasing awareness about PMS can help manage PMS and women's health.*

Keywords: *Premenstrual syndrome, Emotional eating, Mediterranean diet, Dietary habits.*

ÖZET

Amaç: *Premenstrual sendrom (PMS) yaygın bir hastalıktır ve yaşam kalitesini olumsuz yönde etkileyebilecek davranışsal, zihinsel ve fiziksel semptomlarla karakterizedir. Bu çalışmada PMS semptomları, beslenme alışkanlıkları ve duygusal yeme davranışları arasındaki ilişkinin değerlendirilmesi amaçlanmıştır.*

Gereç ve Yöntem: *18-49 yaş arası 462 kadının sosyodemografik, antropometrik, menstrüasyonla ilgili özellikleri, beslenme alışkanlıkları değerlendirilmiş ve Premenstrual Sendrom Ölçeği (PMSÖ), Akdeniz Diyetine Uyum Ölçeği (MEDAS) ve Duygusal Yeme Ölçeği (DYÖ) uygulanmıştır.*

Bulgular: *Kadınların %66.9'unda (n=309) PMS saptanmıştır. PMS'li kadınların PMSÖ alt boyut ve toplam puanları ile DYÖ puanı PMS'i olmayan kadınlardan daha yüksektir ($p<0.05$). MEDAS puanları gruplar arasında farklılık göstermemektedir ($p=0.841$). PMSÖ toplam ile DYÖ puanları arasında pozitif ($r=0.257$, $p<0.001$), MEDAS ile DYÖ puanları arasında negatif korelasyon ($r=-0.090$, $p=0.007$) bulunmuştur. PMS'li kadınlarda menstruasyon öncesi dönemde rafine tahıllar, kahve, paketlenmiş ürünler ve meşrubat tüketim sıklığı daha yüksektir ($p<0.05$).*

Sonuç: *PMS ile duygusal yeme arasında ilişki saptanmıştır ve premenstrual dönemde sağlıklı beslenme alışkanlıklarına uymayan besinler tercih edilmektedir. PMS hakkındaki farkındalığın arttırılmasının, PMS'in ve kadın sağlığının yönetimine yardımcı olabileceği düşünülmektedir.*

Anahtar Kelimeler: *Premenstrual sendrom, Duygusal yeme, Akdeniz diyeti, Beslenme alışkanlıkları.*

INTRODUCTION

Premenstrual syndrome (PMS) is a prevalent disorder in women of reproductive age. Many physical, behavioral, and emotional symptoms of PMS – such as headaches, backaches, breast tenderness, depression, fatigue, anxiety, appetite changes, and insomnia – can significantly impair the quality of life (Esmaeilpour, Ghasemian & Alizadeh, 2019). PMS causes decreased occupational productivity, disruptions in interpersonal relationships and daily activities, and an increased need for health services (Dennerstein, Lehert, Bäckström & Heinemann, 2010). Although the prevalence of PMS varies depending on many factors, such as exercise, culture, lifestyle, nutrition, and diseases, it is highly prevalent (Dehnavi, Jafarnejad & Goghary, 2018). France had the lowest prevalence of PMS at 12%, while Iran had the highest prevalence at 98%, despite a meta-analysis reporting a global prevalence of PMS of 47.8% (Direkvand-Moghadam, Sayehmiri, Delpisheh & Kaikhavandi, 2014). Studies conducted on fertile women between the ages of 15-49 in Turkey report different rates of PMS, ranging from 48.8-72.2% (Adıgüzel, Taşkın & Danacı, 2007; Yeşildere Sağlam, 2017; Özçelik, 2019; Akmalı, Özerdoğan & Gürsoy, 2020).

There are no specialized hematological or biochemical tests for diagnosing PMS (Marjoribanks, Brown, O'Brien & Wyatt 2013). Symptoms usually begin after ovulation and reach a peak level in the luteal phase due to increased progesterone secretion. With the onset of menstrual bleeding, symptoms are relieved, while symptoms are replaced by well-being due to increased estradiol secretion in the follicular phase (Rapkin & Akopians, 2012; Appleton, 2018). A detailed patient history, physical examination, and symptom chart filled through two prospective menstrual cycles are used for diagnosis. The common view in defining PMS is that at least 5 of the 11 symptoms are present in the last week of the luteal phase. These symptoms are: 1) depressed mood, 2) tension/anxiety, 3) emotional responsibility and crying, 4) irritability/anger, 5) decreased interest in usual activities, 6) difficulty concentrating, 7) fatigue, sleepiness, 8) changes in appetite, 9) hypersomnia, insomnia, 10) feeling overwhelmed, and 11) physical symptoms (Zamani, Neghab & Torabian, 2012).

PMS treatment primarily aims to relieve symptoms (Biggs & Demuth, 2011). Women who experience severe PMS should be treated with a multidisciplinary approach by a gynecologist, mental health professional (psychiatrist or clinical psychologist), and dietitian (Green, O'Brien, Panay & Craig, 2017). The pharmacological treatment of PMS includes gonadotropin-releasing hormone (GnRH) agonists, oral contraceptives, and selective serotonergic antidepressants. Nutrition and exercise are recommended to alleviate the symptoms of PMS. While it is recommended to consume more complex carbohydrates and less alcohol, caffeine, and refined sugar, especially in the luteal phase, the benefit of exercise in managing PMS is also reported. Lifestyle changes are considered as a factor facilitating the identification of triggers during symptom follow-up (Appleton, 2018).

While the severity of PMS is affected by the diet of the individual, PMS can also affect the symptoms by influencing the individual's food choices (Isgin-Atici, Buyuktuncer, Akgul & Kanbur, 2018). Research has indicated that the increase in consumption of sweet foods, fast-food foods, fried foods, coffee, and alcohol is associated with PMS. It has been suggested that vegetable-based, low-fat, and high-fiber diet models are associated with reduced premenstrual symptoms (Seedhom, Mohammed & Mahfouz, 2013; Cheng, et al., 2013). According to a study, during the luteal phase, women with PMS had more high-sugar foods, cakes, and sweets and consumed less milk, vegetables, and fruits (Cross, Marley, Miles & Willson, 2001). Increased energy-dense food consumption and a sedentary lifestyle are related to an increased risk of obesity in the presence of PMS. Therefore, it is recommended to do light exercise by increasing the intake of complex carbohydrates, fruits, vegetables, and water consumption while restricting sugar and sugary foods in the premenstrual period (Şanlıer & Yabancı, 2004). The randomized controlled study observed that the physical, mental, and behavioral symptoms of PMS decreased in the intervention group that consumed four servings or more of whole grain products rich in dietary fiber, iron, B vitamins, magnesium, and vitamin E. The effects of a high-B-group vitamin diet on the metabolism of neurotransmitters involved in PMS etiology help to explain it (Esmaeilpour et al., 2019). It has also been discovered that adequate intake of essential fatty acids can positively impact PMS symptoms. This effect is related to the decreased tissue

sensitivity of prostaglandin E1, which is affected by essential fatty acids, to the hormone prolactin, thus preventing the increase in prolactin levels (Rocha Filho, Lima, Neto & Montarroyos, 2011). PMS symptoms can be effectively managed by increasing the intake of complex carbohydrates by consuming enough calcium, magnesium, zinc, and iron during the premenstrual period; and lowering the intake of saturated fat, salt, and caffeine (Isgin-Atici et al., 2018).

The Mediterranean diet (MD) is a dietary model that originates from a traditional and sustainable lifestyle and is high in fresh fruits and vegetables, fish, high antioxidant and polyphenol content, as well as low saturated fat and high vegetable oil intake (Davis, Bryan, Hodgson, & Murphy, 2015). It has been reported that the MD may have beneficial effects on the prevention and treatment of PMS, and low compliance with the MD is related to increased PMS symptoms (Kwon, Sung & Lee, 2022).

Emotional eating behavior is defined as a type of dysfunctional behavior that the individual develops to overcome anxiety and negative emotions resulting from inadequate regulation of negative emotions (Zysberg, 2018). Emotional eating, a condition mostly seen in women, has been demonstrated in many social, clinical, and non-clinical examples throughout life (Vandewalle, Moens, Beyers & Braet, 2016). There is an association between emotional eating and weight gain and obesity development by increasing the ingestion of foods high-energy and fat-containing foods. It is stated that emotional eating behavior increases with increased PMS (Çoban, Karakaya, Önder, İşleyen & Adanır, 2021). High body mass index (BMI), which is common in women with PMS, has been associated with the emotional response to food, which is thought to be a factor explaining the obesity mechanism of PMS (Yenet al., 2010).

MATERIAL AND METHODS

Research Type

This cross-sectional study aimed to evaluate the relationship between PMS symptoms and emotional eating behavior, changes in dietary habits, and adherence to the MD. The study was conducted through a convenience sampling method between January and March 2021 through an online survey.

Study Population and Sample

Inclusion criteria were 18-49 years of age, not pregnant or breastfeeding, not using oral contraceptives, antidepressants, or hormone replacement therapy, renal disease, diabetes, insulin resistance, thyroid disorders, polycystic ovary syndrome, rheumatological disease, allergy, psychiatric not being diagnosed with the disease, and not entering menopause were determined. The study was carried out using the convenience sampling method with women between the ages of 18 and 49 between January and March 2021. It was planned to include at least 176 participants in the study, with a 95% confidence level and an acceptable error of 5%, according to the sample of the unknown population. To increase the representativeness of the universe, 569 women were reached through an online survey. Questions regarding exclusion criteria were asked to assess whether participants met the inclusion criteria, and individuals who did not meet the inclusion criteria or who gave incomplete or repeated responses to the study questions were not included in the study. Accordingly, 51 women for using oral contraceptives, 4 women for using antidepressants, and 52 women who were diagnosed with a disease by a doctor were excluded from the study, and 462 women who met the inclusion criteria were evaluated.

Data Collection Tools

General Characteristics Form: The data collection form prepared to evaluate the individuals' sociodemographic and anthropometric information, general health status, life habits, menstrual characteristics and changing eating habits in the premenstrual period, their compliance with the Mediterranean diet, emotional eating and PMS conditions was applied online. Anthropometric measurement (height and body weight) based on individuals' self-reports was questioned, and BMI was calculated and classified based on the World Health Organization (WHO, 1995).

Dietary Habits: The types of foods that are reported to vary frequently in the amount of consumption in the 7-10 days before menstruation were determined by examining the literature (Cross et al., 2001; Şanlıer & Yabancı, 2004; Reed, Levin & Evans, 2008; Çukurovalı Soykurt, 2016; Özmermer, 2017; Isgin-Atici K et al., 2018), and the change in the consumption of these foods before and after the menstruation period was questioned.

The Premenstrual Syndrome Scale (PMSS): The

PMSS, which was developed and validated by Gençdoğan in 2006 to measure premenstrual symptoms and determine their severity, consists of 44 items in a five-point Likert type (1=never, 2=very little, 3=sometimes, 4=often, 5=constantly). The scale has nine sub-scales: depressive affection, anxiety, fatigue, irritability, depressive thoughts, pain, appetite changes, sleep changes, and bloating. The scale's lowest possible score is 44, while its greatest possible value is 220. The higher score indicates a higher intensity of PMS symptoms. While evaluating the scale, it is determined if PMS is "present" (≥110 points) or "absent" based on whether the overall score exceeds 50% of the maximum score. The Cronbach's alpha value of the PMSS was reported as 0.75 (Gençdoğan, 2006).

The Mediterranean Diet Adherence Scale (MEDAS): The scale was used in the Prevention with Mediterranean Diet study (Martínez-González et al., 2012). The MEDAS was validated by Schröder et al. (2011) and is considered a suitable tool for measurement of adherence to the MD. The validation of MEDAS to Turkish was carried out by Özkan Pehlivanoğlu et al. in 2020. There are 14 questions in the MEDAS; each question is worth 1 or 0 points. While an acceptable degree of adherence to the MD is indicated by a total score of seven or higher, a score of nine or above denotes a high degree of MD adherence. The Cronbach's alpha value of the MEDAS was reported as 0.829 (Özkan Pehlivanoğlu et al, 2020).

The Emotional Eating Scale (EES): The EES was developed to measure the emotional eating behaviors of adults. The EES comprises 14 items in a 5-point Likert type. The score obtained from the scale increases, emotional eating also increases. The Cronbach's alpha value of the EES was reported as 0.94 (Doğan et al., 2011).

Ethical Consideration

The research was approved in terms of medical ethics (Date: 17.08.2023 and Approval Number: 2023-13/447) and conducted in accordance with the Declaration of Helsinki. Individuals were informed about the study and their consent was obtained.

Data Analysis

The obtained data were analyzed using IBM SPSS v.25.0. The normal distribution of the data was assessed using the Shapiro-Wilk and Kolmogorov-Smirnov tests. Non-parametric methods were used because the scores obtained from the scales did not show a normal distribution. The Pearson chi-square test was used for the differences in group distributions, and the Mann-Whitney-U test was used for the comparison of two groups in group differences analysis. Kendall's tau-b analysis was used to determine the correlations. Logistic Regression Analysis was applied with the independent variables that had a significant relationship in multivariate analysis. For this study, Cronbach's Alpha values for the PMSS, MEDAS and EES were found to be 0.976, 0.897 and 0.968, respectively. The level of significance was taken as p=0.05.

RESULTS

According to the PMSS, 33.1% of the individuals (n=153) did not have PMS, while 66.9% of them (n=309) had PMS. According to the presence of PMS, demographic, anthropometric and menstrual period characteristics of individuals are given in Table 1. The mean age of women with PMS (26.04±5.55 years) is lower than those without PMS (27.61 ± 5.90 years) (p=0.002). There was no difference between the two groups in terms of BMI classification, age at menarche, regular menstruation, and menstruation duration (p>0.005). 23.0% of women with PMS reported that they experienced dysmenorrhea frequently, 28.5% always, and it was determined that the frequency of dysmenorrhea with PMS was higher than those without PMS (p<0.001).

Table 2 shows the evaluation of PMSS total and sub-scales, EES, and MEDAS scores. The mean of PMSS in all sub-scales and total score were higher in individuals with PMS (p<0.05 for all). The mean EES score was 30.05 ± 14.35 in individuals without PMS and 38.95 ± 16.50 in those with PMS, and the EES score was higher in women with PMS than those without PMS (p<0.001). The mean MEDAS score was 6.22 ± 1.79 in individuals without PMS and was determined as 6.16 ± 1.92 in those with PMS (p=0.841). Of individuals without PMS, 56.9% had low adherence to the Mediterranean diet, 32.0% were acceptable, and 11.1% high; on the other hand, 56.3% of individuals with PMS had low, 32.4% were acceptable, 11.3% had high adherence (p=0.908).

According to MEDAS classification differences between individuals' age, BMI, the PMSS total and sub-scales, and the EES total scores were evaluated. The mean BMI was determined higher (23.95 ± 5.23 kg/m2) in those with low adherence

Table 1. The Evaluation of Demographic, Anthropometric, and Menstrual Period Characteristics

	Presence of PMS					
	PMS (-) (n=153)		PMS (+) (n=309)			
	Mean ± SD	**Median (Min-max)**	**Mean ± SD**	**Median (Min-max)**	**Z**	**p [a]**
Age (years)	27.61 ± 5.90	25.90 (18.00-48.80)	26.04 ± 5.55	25.40 (18.10-48.50)	-3.036	0.002*
Age at menarche (years)	13.11 ± 1.29	13.00 (10.00-17.00)	13.16 ± 1.41	13.00 (10.00-18.00)	-0.092	0.926
Period of menstruation (days)	6.09 ± 1.47	6.00 (2.00-10.00)	6.03 ± 1.39	6.00 (3.00-10.00)	-0.260	0.795
Marital status	**n**	**%**	**n**	**%**	**χ^2**	**p [b]**
Married	66	43.1	107	34.6	3.163	0.075
Single	87	56.9	202	65.4		
Level of education						
Primary/secondary school	8	5.3	16	5.1	8.953	0.062
High school	30	19.6	94	30.4		
University	101	66.0	182	58.9		
Postgraduate	14	9.2	17	5.5		
Profession						
Employee	41	26.8	69	22.3	24.872	<0.001*
Student	29	19.0	119	38.5		
Unemployed	83	54.3	121	39.1		
Income						
Less than expenses	35	22.9	91	29.4	3.009	0.222
Equal to expenses	74	48.4	147	47.6		
More than expenses	44	28.8	71	23.0		
BMI classification						
Underweight	14	9.2	28	9.1	0.545	0.909
Normal	91	59.5	194	62.8		
Overweight	32	20.9	58	18.8		
Obese	16	10.5	29	9.4		
Menstrual pattern						
Regular	135	88.2	261	84.5	1.187	0.276
Irregular	18	11.8	48	15.5		
Dysmenorrhea						
Never	18	11.8	10	3.2	28.188	<0.001*
Rarely	42	27.5	63	20.4		
Sometimes	48	31.4	77	24.9		
Frequently	24	15.7	71	23.0		
Always	21	13.6	88	28.5		
History of applying to a health institution for premenstrual problems						
Yes	27	17.6	87	28.2	6.080	0.014*
No	126	82.4	222	71.8		
Presence of premenstrual problems in women in the family						
Yes	57	37.3	139	45.0	2.503	0.114
No	96	62.7	170	55.0		

BMI: body mass index, PMS: premenstrual syndrome, SD: standard deviation
*p<0,05 [a]Mann-Whitney U test [b]Pearson chi-square test

to the Mediterranean diet (p<0.05). The mean EES score was 37.63 ± 16.64 in individuals with low adherence to the Mediterranean diet, 33.54 ± 15.61 in those with acceptable adherence, and 34.87 ± 16.29 in those with high adherence. The mean EES score was determined higher (37.63 ± 16.64) in those with low adherence to the Mediterranean diet (p<0.05) (unshown data).

Table 2. The Evaluation of the PMSS, EES, and MEDAS Scores

	Presence of PMS					
	PMS (-) (n=153)		**PMS (+) (n=309)**			
	Mean ± SD	**Median (Min-max)**	**Mean ± SD**	**Median (Min-max)**	**Z**	**p [a]**
PMSS						
Depressive affection	14.66 ± 5.06	14.00 (7.00-27.00)	25.96 ± 5.39	27.00 (9.00-35.00)	-15.245	<0.001 *
Anxiety	9.38 ± 2.80	9.00 (7.00-18.00)	19.21 ± 6.60	19.00 (7.00-35.00)	-14.974	<0.001 *
Fatigue	12.47 ± 4.27	12.00 (6.00-22.00)	22.38 ± 4.81	22.00 (11.00-30.00)	-15.173	<0.001 *
Irritability	11.28 ± 4.46	11.00 (5.00-25.00)	19.18 ± 4.15	19.00 (9.00-25.00)	-13.793	<0.001 *
Depressive thoughts	9.62 ± 3.19	8.00 (7.00-20.00)	22.03 ± 7.19	21.00 (7.00-35.00)	-15.721	<0.001 *
Pain	5.54 ± 2.64	5.00 (3.00-12.00)	10.22 ± 3.01	10.00 (3.00-15.00)	-12.940	<0.001 *
Appetite changes	7.56 ± 3.29	7.00 (3.00-15.00)	11.24 ± 3.01	12.00 (3.00-15.00)	-10.289	<0.001 *
Sleep changes	4.91 ± 2.30	4.00 (3.00-15.00)	9.85 ± 3.16	10.00 (3.00-15.00)	-13.683	<0.001 *
Bloating	8.28 ± 3.63	8.00 (3.00-15.00)	11.31 ± 3.20	12.00 (3.00-15.00)	-8.127	<0.001 *
PMSS total score	83.73 ± 18.19	86.00 (45.00-110.00)	151.41 ± 28.34	147.00 (111.00-220.00)	-17.503	<0.001 *
EES	30.05 ± 14.35	28.00 (14.00-70.00)	38.95 ± 16.50	36.00 (14.00-70.00)	-5.744	<0.001 *
MEDAS	6.22 ± 1.79	6.00 (1.00-10.00)	6.16 ± 1.92	6.00 (2.00-11.00)	-0.201	0.841
MEDAS classification	**n**	**%**	**n**	**%**	**χ^2**	**p [b]**
Low adherence	87	56.9	174	56.3		
Acceptable adherence	49	32.0	100	32.4	0.013	0.908
High adherence	17	11.1	35	11.3		

EES: Emotional Eating Scale, MEDAS: Mediterranean Diet Adherence Scale, PMS: premenstrual syndrome, PMSS: Premenstrual Syndrome Scale, SD: standard deviation *p<0.05 [a]Mann-Whitney U test [b]Pearson chi-square test

According to the presence of PMS, the distribution of changes in the consumption preferences of individuals for some foods during the 7-10 days before menstruation is given in Table 3. Women with PMS were more likely to report increased consumption of refined grains, sweetened or sugary foods, coffee, alcoholic beverages, packaged foods, and beverages during the premenstrual period than women without PMS (p<0.05).

The correlation between the age, BMI, PMSS sub-scales and total scores, MEDAS, and EES scores is shown in Table 4. The moderate positive correlations were determined between the PMSS total and the EES score (r=0.257, p<0.001), and between the appetite changes sub-scale of PMSS and the EES score (r=0.354, p<0.001). The weak

Table 3. Distribution of Changes in Food Preferences in the Premenstrual Period

	Presence of PMS					
	PMS (-) (n=153)		PMS (+) (n=309)			
	n	%	n	%	χ^2	p [a]
Whole grain products						
Increased	12	7.8	34	11.0		
Decreased	17	11.2	43	14.0	2.119	0.347
No change	124	81.0	232	75.0		
Legumes						
Increased	12	7.8	26	8.4		
Decreased	8	5.3	38	12.3	5.906	0.052
No change	133	86.9	245	79.3		
Red meat						
Increased	21	13.7	48	15.5		
Decreased	16	10.5	39	12.6	0.847	0.655
No change	116	75.8	222	71.9		
Fish						
Increased	9	5.8	17	5.5		
Decreased	15	9.8	44	14.2	1.809	0.405
No change	129	84.4	248	80.3		
Egg						
Increased	13	8.5	23	7.4		
Decreased	17	11.2	61	19.8	5.440	0.666
No change	123	80.3	225	72.8		
Vegetables						
Increased	17	11.2	38	12.3		
Decreased	13	8.5	46	14.9	4.173	0.124
No change	123	80.3	225	72.8		
Fruits						
Increased	49	32.1	117	37.9		
Decreased	9	5.8	26	8.4	3.105	0.212
No change	95	62.1	166	53.7		
Refined grains						
Increased	49	32.0	138	44.7		
Decreased	13	8.5	23	7.5	6.834	0.333
No change	91	59.5	148	47.8		
Nuts						
Increased	53	34.7	114	36.9		
Decreased	8	5.2	23	7.4	1.249	0.536
No change	92	60.1	172	55.7		
Fried foods						
Increased	37	24.2	104	33.7		
Decreased	16	10.5	31	10.0	4.440	0.109
No change	100	65.3	174	56.3		
Sweet/sweetened foods						
Increased	106	69.3	253	81.9		
Decreased	14	9.2	7	2.3	14.642	0.001*
No change	33	21.5	49	15.8		
Packaged products						
Increased	89	58.1	233	75.4		

Decreased	12	7.9	12	3.9	14.632	0.001*
No change	52	34.0	64	20.7		
Coffee						
Increased	35	22.9	115	37.2		
Decreased	14	9.2	36	11.7	12.191	0.002*
No change	104	67.9	158	51.1		
Beverages						
Increased	42	27.4	162	52.4		
Decreased	17	11.2	24	7.8	25.941	<0.001*
No change	94	61.4	123	39.8		
Alcoholic beverages						
Increased	2	1.4	14	4.5		
Decreased	12	7.8	47	15.2	8.790	0.012*
No change	139	90.8	248	80.3		

PMS: premenstrual syndrome *p<0,05 [a]Pearson chi-square test

negative correlations were detected between MEDAS and EES scores (r=-0.090, p=0.007), and MEDAS and BMI (r=0.215, p<0.001).

According to the logistic regression analysis performed to predict the presence of PMS with the individuals' mean age, MEDAS, and EES scores, it was determined that the independent factors that increased the presence of PMS were age (β=0.958; p=0.0.15) and EES score (β=1.038; p=<0.001) (Table 5).

DISCUSSION

PMS, which is a common disorder in women of reproductive age, is associated with several mental, behavioral, and physical symptoms and negatively affects women's quality of life (Esmaeilpour et al., 2019). While research states that PMS has a bidirectional relationship with nutrition, it is reported that nutrition with a process accompanied by emotional eating may cause worsening of PMS symptoms and obesity. The literature emphasizes the effectiveness of dietary and lifestyle changes in the treatment and prevention of PMS (Cross et al., 2001; Şanlıer & Yabancı, 2004; Reed et al., 2008; Seedhom et al., 2013; Özmermer, 2017; Çoban et al., 2021). This study aimed to evaluate emotional eating behavior and the direction of the change in eating habits in the premenstrual period to better understand the relationship between nutrition and PMS.

There are different studies evaluating the relationship of PMS with age. These studies indicate that symptoms increase with age and end with menopause due to a decrease in ovarian activity. Retrospective studies indicate that symptoms begin at an average age of 26, and clinical data suggest that PMS symptoms peak between the late 20s and 30s (Freeman, 2007). Various studies suggest that PMS begins at any age after the first menstruation, usually between adolescence and the 20s (Tanrıverdi, Selçuk & Okanlı, 2010). In the present study, the mean age of women with PMS was lower than those without PMS. In a study, 35.4% of women with PMS are in the age group of 26 years and older (Rapkin & Akopians, 2012). In another study, it was stated that the frequency of PMS differed significantly with age (Dehnavi et al., 2018).

According to reports, obesity may influence hormonal, neurological, and behavioral processes that lead to the onset of PMS. The Nurses' Health Study II evaluated the association of adiposity and weight change with the development of PMS. While a positive correlation is observed between PMS and BMI, it is suggested that PMS can be avoided by maintaining a healthy body weight. According to reports, there is a 3% increase in PMS risk for every 1 kg/m2 increase in BMI, and certain symptoms such as swelling in the extremities, back pain, mood swings, and cravings are linked to higher BMI (Bertone-Johnson, Hankinson, Willett, Johnson & Manson, 2010). While the distribution according to BMI classification did not differ according to the presence of PMS in this study, no difference was found between the mean BMI of the groups in another study (Kwon et al., 2022).

In this study, no difference was detected in the frequency of regular menstruation in women according to the presence of PMS (84.5% vs. 88.2%, p=0.276). However similar results were reported in another study (82.1% vs. 82.2, p=0.980) (Dönmez & Gümüşsoy, 2019).

Table 4. The Correlation Between Some Characteristics of Women and PMSS, EES, and MEDAS Scores

		A	B	C	D	E	F	G	H	I	J	K	L	M
Age	**r**	0.180*	-0.131*	-0.143*	-0.116*	0.091*	-0.138*	-0.088*	-0.055	-0.054	-0.057	-0.130*	0.072*	-0.056
	P	<0.001	<0.001	<0.001	<0.001	0.005	<0.001	0.007	0.093	0.096	0.079	<0.001	0.031	0.075
BMI (A)	**r**	-	0.054	-0.095*	-0.015	-0.003	-0.052	-0.033	0.079*	0.002	-0.001	-0.043	-0.090*	0.215*
	p	-	0.090	0.003	0.641	0.928	0.101	0.316	0.017	0.961	0.985	0.172	0.007	<0.001
PMSS-Depressive affection (B)	**r**		-	0.565*	0.587*	0.565*	0.597*	0.425*	0.344*	0.451*	0.276*	0.701*	-0.038	0.228*
	p		-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.267	<0.001
PMSS-Anxiety (C)	**r**			-	0.506*	0.439*	0.635*	0.453*	0.263*	0.466*	0.261*	0.667*	-0.043	0.187*
	p			-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.211	<0.001
PMSS-Fatigue (D)	**r**				-	0.558*	0.621*	0.524*	0.401*	0.553*	0.331*	0.729*	-0.017	0.247*
	p				-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.619	<0.001
PMSS-Irritability (E)	**r**					-	0.551*	0.421*	0.387*	0.400*	0.352*	0.653*	-0.047	0.207*
	p					-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.173	<0.001
PMSS-Depressive thoughts (F)	**r**						-	0.520	0.347*	0.530*	0.302*	0.765*	-0.034	0.251*
	p						-	<0.001	<0.001	<0.001	<0.001	<0.001	0.323	<0.001
PMSS-Pain (G)	**r**							-	0.300*	0.525*	0.341*	0.587*	0.005	0.146*
	p							-	<0.001	<0.001	<0.001	<0.001	0.885	<0.001
PMSS-Appetite changes (H)	**r**								-	0.323*	0.277*	0.442*	-0.048	0.354*
	p								-	<0.001	<0.001	<0.001	0.169	<0.001
PMSS-Sleep changes (I)	**r**									-	0.326*	0.600*	-0.029	0.225*
	p									-	<0.001	<0.001	0.411	<0.001
PMSS-Bloating (J)	**r**										-	0.403*	0.010	0.088*
	p										-	<0.001	0.781	0.008
PMSS-Total (K)	**r**											-	-0.030	0.257*
	p											-	0.361	<0.001
MEDAS (L)	**r**												-	-0.098*
	p												-	0.004
EES (M)	**r**													-
	p													-

BMI: body mass index; PMS: premenstrual syndrome; PMSS: Premenstrual Syndrome Scale; MEDAS: Mediterranean Diet Adherence Scale; EES: Emotional Eating Scale
* p<0.05; Kendall's tau-b test

Table 5. Independent Factors Affecting the Presence of PMS

Variables	B	SE	95% CI Low-Upp	β	p
Age	-0.043	0.018	0.925 – 0.992	0.958	**0.015***
MEDAS	0.032	0.056	0.925-1.153	1.032	0.571
EES	0.037	0.007	1.024-1.053	1.038	**<0.001***
			$R^2 = 0.112$		

MEDAS: Mediterranean Diet Adherence Scale; EES: Emotional Eating Scale; B: Estimates of unstandardized regression weight; SE: Standard error; CI: Confidence interval; β: Estimates of standardized regression weight * p<0.05

Yeşildere Sağlam (2017) reported that the frequency of regular menstruation in women with PMS was lower than those without PMS (71.5%, 81.3%, respectively, p=0.002). In Bozkurt's (2019) study, it is stated that 11.9% of adult women never experience dysmenorrhea, 45.6% occasionally, and 42.5% always. Aba et al. (2018) reported that 57.2% of women with PMS and 43.3% of women without PMS experienced pain during menstruation (p<0.001). In this study, the frequency of dysmenorrhea in women with PMS (28.5% always, 23.0% frequently) was found to be higher than those without PMS. In the study of Ünal and Erbay Dündar (2016) evaluating PMS in women between the ages of 15-49, 17% of individuals stated that they applied to a health institution for premenstrual problems. In another study, this rate was 19.7% for women in the same age group (Kebapçılar, Taner, Başoğul & Okan, 2012). This study determined that the history of applying to a health institution before menstruation was higher in women with PMS (28.2% vs. 17.6%) (p<0.001).

Hormones associated with the menstrual cycle can fluctuate, which can impact eating habits and appetite. Changes in the desire to eat are often associated with depression. Therefore, the increase in appetite and desire for food in the premenstrual period is explained by the decrease in serotonin levels (Rapkin & Akopians, 2012; Appleton, 2018). In a study examining the dietary habits of 100 women aged 20-45 years before, during, and after the menstrual period, sweet and bitter tastes were craved in the premenstrual period; fewer vegetables and fruits, more meat, more grains, and more nuts were reported to be consumed (Pınar & Öncel, 2007). In the study conducted by Şanlıer & Yabancı (2004), the consumption of chocolate, milk desserts, pastries, and nuts increased in the premenstrual period compared to the postmenstrual period of 360 young women in the 17-26 age group. It is also stated that there was a reduscton in the consumption of sour, bitter, and salty foods (Şanlıer & Yabancı, 2004). In another study, 198 women between 16 and 48 years were examined. It was stated that while there was a decrease in the consumption of pulses, cereals, vegetables, and fruits in the premenstrual period, there was a considerable increase in the consumption of sugary sweets. There was a decrease in the energy intake after the menstruation (p<0.001) (Aksoy & Semerci, 1988). Cross et al. (2001) examined 144 women, 88 of whom had PMS with a BMI of 24-37 kg/m2, with food consumption records in the pre- and postmenstrual periods. It has been reported that in the premenstrual period, there is a remarkable increase in total carbohydrate, complex carbohydrate, simple sugar, protein, fat, and total energy intake in women with PMS and only fat and total energy intake in the non-PMS group. At the same time, Cross et al. (2001) stated that women with PMS consume less milk, vegetables, and fruits and more high-sugar foods, cakes, and sweets in the premenstrual period. According to Reed et al. (2008), compared to women without PMS, women with premenstrual dysphoric disorder have noticeably higher cravings for fatty and sugary foods, high carbohydrate foods, and alcohol during the luteal phase. In the study of Özmermer (2017), 48.1% of individuals with PMS preferred sweet and floury foods, 34.5% of them overate, 4.5% of them preferred to eat vegetables and fruits to cope with the increase in appetite due to premenstrual symptoms. It is reported that 0.6% prefer to eat nuts. In this study, similar to the literature, the increase in the consumption of sweet/sweetened foods (p=0.001), coffee (p=0.002), alcoholic beverages (p=0.012), packaged products (p=0.001) and sugary drinks (p<0.001) in the premenstrual period was found to be high in individuals with PMS.

In the literature, it is evaluated that the healthy diet model is protective against PMS, and the western-style diet is a factor that increases PMS morbidity (Farasati et al., 2015). The study of Isgın-Atıcı et al. (2020) evaluated the effect of diet quality with the Healthy Eating Index (HEI)-2010 on PMS severity and development in 272

adolescents, 155 of whom had PMS. According to the study, total HEI-2010 score, whole grain, fruit, seafood, and vegetable protein ingestion in the PMS group were lower than control group. In contrast, consumption of refined grains was higher. Therefore, improving diet quality is vital to alleviate the severity of PMS or prevent its development (Isgın-Atıcı et al., 2020). Farasati et al. (2015) stated that the western-style diet model increases PMS morbidity. Similarly, in another study, the western-style diet model is positively associated with the risk of PMS, while the healthy eating model (rich in dried fruit, nuts, fish, yogurt, legumes, garlic, fruit and canned fruits, spices) and the traditional diet (rich in eggs, fruits, vegetables, whole grains, high daily fat intake, salty snacks, red meat, refined grains, mayonnaise, and skinless poultry) are considered protective against PMS (MoradiFili et al., 2020). In the present study, no significant difference was detected between the mean MEDAS score, the distribution of individuals complying with the MD according to the presence of PMS. It is thought that the high frequency of individuals with poor compliance to the MD in both groups may negatively impact health.

Emotional eating behavior is interpreted as a person's use of food to escape from negative emotions and can bring many conditions, such as obesity, eating disorders, and hormonal problems (Zysberg, 2018). Çoban et al. (2021) state that the severity of emotional eating behavior is the highest in the PMS group and that emotional eating behavior increases with the increase in premenstrual symptoms ($p<0.001$). Aydın Kartal and Kaykısız (2020) and Batman and Yılmaz (2023) reported a positive and significant correlation between emotional eating behavior and total PMSS score. Similarly, this study found a significantly higher EES score in people with PMS. Also, a weak and negative correlation between the EES and the MEDAS score was determined. A negative relationship was found between the MD adherence score and emotional response (Aydın Kartal & Kaykısız, 2020). While it is stated that high adherence to the MD reduces the negative effect by increasing the clarity of emotions, it is thought to be related to the monounsaturated and omega-3 fatty acids in the diet and, therefore, to high antioxidant intake (Holt et al., 2014).

This research has some limitations. The causal relationship between the change in diet before and after menstruation could not be examined because of the cross-sectional design of the study. In addition, the interviews were conducted in the form of an online survey, not face-to-face. Therefore, biochemical data or detailed anthropometric data related to PMS could not be obtained.

CONCLUSION

Menstruation is a condition that affects women for a significant part of their lives, beginning in adolescence and lasting until menopause. Findings show that PMS is associated with emotional eating and changes in nutrition during the luteal phase. Both emotional eating behavior and changes in premenstrual nutrition are factors that increase PMS symptoms and trigger obesity. Considering PMS risk factors, interventions to prevent PMS and to reduce the risk of long-term chronic diseases during adolescence are recommended for both reproductive-age women's health and post-menopausal health investment. Therefore, in addition to improving the knowledge and attitude of women of reproductive age about menstruation and increasing their awareness of PMS, lifestyle interventions such as healthy nutrition and exercise may help in the management of PMS and improve women's health.

Ethics Committe Approval

Ethics committee approval was received for this study from the Acıbadem University Ethics Committee (Date: 17.12.2020, Approval Number: 2020/26).

Author Contributions

Idea/Concept: N.Ç.B., E.A; Design: N.Ç.B., E.A., Y.K.; Supervision/Consulting: N.Ç.B.; Analysis and/or Interpretation: N.Ç.B., E.A.; Literature Search: N.Ç.B., E.A., and Y.K.; Writing the Article: N.Ç.B., E.A., Y.K.; Critical Review: N.Ç.B., E.A.

Peer-review

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Conflict of Interest

The authors have no conflict of interest to declare.

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