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Adherence to 24-Hour Movement Guidelines in Reducing Premenstrual Symptoms: Physical Activity, Sleep, and Sedentary Behaviors

Premenstrual Semptomların Azaltılmasında 24 Saatlik Hareket Yönergelerine Uyum: Fiziksel Aktivite, Uyku ve Sedanter Davranışlar

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Abstract

Premenstrual syndrome (PMS) is a prevalent condition impacting a substantial proportion of women of reproductive years. This study aims to investigate the impact of women's compliance with 24-hour movement guidelines (being physically active, reducing sedentary behaviors, and adequate sleep quality) on the likelihood of experiencing PMS symptoms. One hundred thirty women aged 18 to 30 who fulfilled the inclusion criteria participated in the study. Participants were evaluated and categorized based on the 24-hour movement guidelines. Data were gathered utilizing the premenstrual syndrome scale and the visual pain scale. Analyses were conducted using the IBM SPSS 20 statistical analysis software. The study's findings indicated that women who followed the 24-hour movement guidelines were less prone to have PMS symptoms than those who did not. Physical activity, sedentary behaviors, sleep, and daytime screen exposure may contribute to the alleviation of PMS symptoms, and compliance with 24-hour movement guidelines enhances women's quality of life.

Keywords: Premenstrual syndrome, Sleep, Physical activity, Sedentary behaviors

Özet

Premenstrual sendrom (PMS), üreme çağındaki kadınların önemli bir bölümünü etkileyen yaygın bir durumdur. Bu çalışma ile kadınların 24 saatlik hareket yönergelerine (fiziksel olarak aktif olmak, hareketsiz olan davranışların azaltılması ve yeterli düzeyde uyku kalitesi) bağlılıklarının PMS semptomları yaşama olasılıklarının etkisini incelemeyi amaçlamaktadır. Çalışmaya dahil edilme kriterlerini karşılayan 18 ila 30 yaş aralığında 130 kadın katılmıştır. Katılımcılar, 24 saatlik hareket yönergesine göre değerlendirilmiş ve sınıflandırılmıştır. Veriler, premenstrual sendrom ölçeği ve görsel ağrı skalası kullanılarak toplanmıştır. Analizler IBM SPSS 20 istatistik analiz programı ile kullanılmıştır. Çalışmanın bulguları, 24 saatlik hareket yönergelerine uyan kadınların, uymayanlara kıyasla PMS semptomları yaşama olasılıklarının düşük olduğu sonucu bulunmuştur. Gün içerisinde yapılan fiziksel aktivite, sedanter davranışlar, uyku ve ekrana maruz kalmanın PMS semptomlarını hafifletmede rolü olduğu ve 24 saatlik hareket yönergelerine uymanın kadınların yaşam kalitelerini yükseltme de etkili olduğu söylenebilir.

Anahtar Kelimeler: Premenstrual sendrom, Uyku, Fiziksel aktivite, Sedanter davranışlar

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INTRODUCTION

Adhering to healthy movement behaviors throughout the day (including sufficient physical exercise, minimizing sedentary behaviors, and ensuring adequate sleep) has important health benefits for different populations (children, adolescents, and adults) (Ferrari et al., 2022; Tremblay et al., 2016). Many countries have published 24-hour movement guidelines with the World Health Organization for recommended levels of physical activity and sedentary behaviors with sleep (Okely et al., 2017; Tremblay et al., 2016; Tremblay et al., 2017). These published guidelines offer different levels of recommendations for different age groups (Arbour-Nicitopoulos et al., 2021; Chemtob et al., 2021). These are increasing the level of physical activity during the day, reducing sedentary behaviors and ensuring adequate night sleep (Luo et al., 2022; Okely et al., 2017; Sun et al., 2023; Tremblay et al., 2016; Tremblay et al., 2017). Although some studies have examined healthy movement behaviors separately, recent studies have found that healthy movement behaviors are related to each other throughout the day (Chaput et al., 2016; Tapia-Serrano et al., 2021). Studies have shown that adult adherence to 24-hour movement guidelines is associated with many health indicators, including total mortality, obesity, cardiometabolic biomarkers and psychological well-being (Chastin et al., 2015; Ferrari et al., 2022; Goncalves et al., 2022; Okely et al., 2017; Rollo et al., 2020; Rollo et al., 2022; Ross & Tremblay, 2020; Tapia-Serrano et al., 2021; Tremblay et al., 2016).

Premenstrual syndrome (PMS) includes (physical, emotional and behavioural symptoms) commonly experienced by women of reproductive age that occur during the late luteal phase of the menstrual cycle (including 7-14 days) before the beginning of menstruation (Conzatti et al., 2021; Karaman et al., 2012; Kawabe et al., 2022; Mohebbi Dehnavi et al., 2018; Takeda, 2023). The symptoms generally peak one week before the onset of menstruation and decrease with the beginning of menstruation, followed by a decline after several days (Ryu & Kim, 2015; Shi et al., 2023). PMS is a common disease affecting around %90 of women of reproductive years (Karaman et al., 2012). PMS symptoms are manifested as physical, emotional and behavioural. Negative emotional states such as irritability, sadness, increased appetite, anxiety, depressed mood, and fear of rejection are observed (Chen et al., 2023; Dilbaz & Aksan, 2021; Mortola et al., 1990). Dominant physical symptoms such as breast discomfort, abdominal distension, and fatigue may be observed (Dilbaz & Aksan, 2021). Changes in cognitive functions, such as feeling uncontrolled and low levels of focus, are also seen (Rapkin & Mikacich, 2013).

Physical activity is an effective method to reduce PMS symptoms by balancing brain chemicals (Kroll-Desrosiers et al., 2017). Studies have shown that physical activity increases endorphin levels in the body and reduces adrenal cortisol, resulting in a decrease in PMS symptoms, an enhancement in the level of pain tolerance experienced, and a decrease in negative emotional states such as anxiety and depression (Mohebbi Dehnavi et al., 2018; Omidali, 2015). Furthermore, physical activity can help decrease PMS symptoms by providing the opportunity to socialize while increasing the fitness of the body (Pearce et al., 2020).

Women between 18 and 50 years of age have more sleep problems in the week before menstruation compared to other periods (Karaman et al., 2012). Sleep problems can boost the severity of PMS symptoms and have a negative impact on general health parameters (Hinz et al., 2017; Mauri et al., 1988). Insufficient sleep can worsen PMS symptoms by causing emotional instability and increased stress levels (Conzatti et al., 2021; Karaman et al., 2012; Nicolau et al., 2018). In contemporary lifestyles, the abundance of developed transportation options and the increase in screen-based entertainment lead to a reduction in physical activity and a boost in sedentary behaviors (Shi et al., 2023). Long-term sedentary behaviors may increase PMS symptoms and cause emotional and cognitive problems as well as physical discomfort (Gaikwad & Kanase, 2022).

The aim of this study was to evaluate the effect of adherence to 24-hour movement guidelines (physical activity, sleep and sedentary behaviors) on PMS symptoms. This study is the first examination of the relationship between 24-hour movement guidelines and premenstrual syndrome.

METHOD

Study Design

The study design was conducted as a cross-sectional study.

Participants

"Does premenstrual syndrome affect physical activity and quality of life? A cross-sectional study" article was taken as a reference, and it was calculated with the G*Power program that a total of 130 female participants should be included in the study at 80% power and 90% confidence level in order for the 6-unit difference to be significant between women who comply with physical activity and women who do not comply with physical activity for a PMS score of 116.79±12.83.

The participants were selected based on the following inclusion criteria: (1) As university students between the age range of 18-30 years old. (2) We have a consistent menstrual cycle that lasts between 21-35 days, with a possible variation of ±7 days. The criteria for exclusion were as follows: (1) recent use of medicines that impact neurotransmitter production (e.g., antidepressants, oral contraceptives, etc.) during the past three months, (2) presence of gynaecological or mental disorders, (3) ongoing pregnancy or recent childbirth. The study had 130 female participants who satisfied the inclusion criteria.

The research was executed in compliance with the principles of the Declaration of Helsinki. All participants signed the informed consent form. Approval from the ethics committee was secured for the undertaking.

Data Collection Procedure

In this study, the Canadian 24-hour movement guidelines (24-HMG) (for people aged 18-64 years) were used as a reference. According to the 24-hour movement guidelines, adults should spend (≥150 min/week) in moderate to vigorous physical activity (MVPA), participate in (sedentary lifestyle (SL) for <8 h/day), and have (screen time ≤ 180 min/day) and (sleep 7-9 h/day) (Kastelic et al., 2023). Participants were categorised for each guideline (1=yes meets guideline; 0=no does not meet guideline).

This study concentrated on the extent of physical activity, sedentary duration, recreational screen usage, uninterrupted sleep duration in the 24-HMG (Luo et al., 2022).

Premenstrual Syndrome Scale

The PMS Scale, developed by Gençdoğan in 2006, is designed to assess premenstrual symptoms and evaluate their severity, with subsequent research done to establish its validity and reliability. This five-point Likert scale comprises 44 items, with a Cronbach's alpha value of 0.75. The measure evaluates PMS symptoms over the past three months and comprises nine sub-dimensions: depressed affect, anxiety, exhaustion, irritability, depressive thoughts, pain, hunger alterations, sleep disturbances, and bloating. The aggregate of the scores derived from these sub-dimensions is referred to as the “PMS scale total score” often known as the PMS scale. The scores achievable on the scale range from 44 to 220, with elevated values signifying severe PMS symptoms. In the evaluation process, PMS is deemed "present" if the total score above 50% of the highest attainable score (Gençdoğan, 2006).

Visual Pain Scale (VAS)

Visual Pain Scale was graded using a 10-cm VAS (Frey-Law et al., 2014). The line was marked with 10 evenly spaced scales, ranging from "no discomfort" on the left to "the most intense pain imaginable" on the right (Kanda et al., 2002).

Statistical Analysis

Statistical analyses were conducted using the IBM SPSS 20 statistical analysis software. Data were reported as mean, standard deviation, median, minimum, maximum, percentage, and number. The normal distribution of continuous data was assessed using the Shapiro-Wilk test, Kolmogorov-Smirnov test, Q-Q plot, skewness, and kurtosis. The Independent Samples t-test was employed for comparisons between two independent groups when the normal distribution requirement was satisfied, but the Mann-Whitney U test was utilized when it was not satisfied. In the comparison of continuous variables with more than two independent groups, ANOVA test was used when the normal distribution condition was met, and Kruskal Wallis test was used when the normal distribution condition was not met. Post-hoc tests after ANOVA test were performed using Tukey's test when variances were homogeneous and Tamhane's T2 test when variances were not homogeneous. Kruskal Wallis 1-way ANOVA (k samples) test was used for post-hoc tests after Kruskal Wallis test. The statistical significance level was taken as $p<0.05$.

RESULTS

The mean age of the participants was 22±3 years, mean height was 169±4, mean weight was 58±5, and mean age at menarche was 13±1.

Table 1. Effect of 24-hour movement guideline adherence on PMS score

Status*	N	$\bar{x}$	Med	SD	Min	Max
PA(+); SB(+); RST(+); ST(-)	3	95.3	97	5.7	89	100
PA(+); SB(+); RST(+); ST(+)	13	96.9	99	8.2	78	106
PA(+); SB(+); RST(-); ST(+)	24	101.3	101	9.3	84	123
PA(-); SB(-); RST(+); ST(-)	2	120.5	121	43.1	90	151
PA(+); SB(-); RST(-); ST(+)	2	126.5	127	29.0	106	147
PA(+); SB(+); RST(-); ST(-)	11	129.9	138	22.4	96	163

PA(+); SB(-); RST(+); ST(-)	1	131.0	131	-	131	131
PA(-); SB(+); RST(-); ST(+)	15	144.0	144	19.9	92	182
PA(-); SB(+); RST(-); ST(-)	18	152.3	152	12.0	124	177
PA(-); SB(-); RST(-); ST(+)	14	153.7	154	11.6	133	170
PA(-); SB(+); RST(+); ST(+)	3	160.7	163	5.9	154	165
PA(+); SB(-); RST(-); ST(-)	1	162.0	162	-	162	162
PA(-); SB(-); RST(-); ST(-)	23	167.3	168	13.2	140	188

***** ***PA:*** *Physical Activity,* ***SB:*** *Sedentary Behavior,* ***RST:*** *Recreational Screen Time,* ***ST:*** *Sleep Time*

When Table 1 is examined, it is seen that in the PMS score effect of compliance with the 24-hour movement instructions, people who meet all instructions and only those who do not comply with the sleep instruction have a low PMS score, and people who do not comply with the 24-hour movement instructions or those who comply with at least a few of them have a higher PMS score. It is thought that the first case "*PA (+); SB (+); RST (+); ST (-)"* is due to the low number of N.

Table 2. The effect of meeting the 24-hour movement guidelines on PMS score

Status	**N**	**x̄**	**Med**	**SD**	**Min**	**Max**
Complying with all guidelines	13.00	96.90	99.00	8.22	78.00	106.00
Not complying with at least one	94.00	134.29	135.45	17.64	114.64	151.91
Not complying with any guidelines	23.00	167.30	168.00	13.17	140.00	188.00

When Table 2 is examined, it is seen that the average PMS score of those who complied with all of the 24-hour movement guidelines was 96.90, those who complied with at least one guideline was 134.29, and the average PMS score of those who did not meet any of the guidelines was 167.30. This emphasises the importance of following the 24-hour movement guideline.

Table 3. The effect of 24-hour movement guideline compliance on menstrual pain score

	Menstrual Pain Score					
Status	**N**	**x̄**	**Med**	**SD**	**Min**	**Max**
PA(+); SB(+); RST(+); ST(-)	13	4	1	4	3	4
PA(+); SB(+); RST(+); ST(+)	3	4	0	4	4	4
PA(+); SB(+); RST(-); ST(+)	24	4	1	4	3	8

PA(-); SB(-); RST(+); ST(-)	11	4	1	4	4	6
PA(+); SB(-); RST(-); ST(+)	1	5	-	5	5	5
PA(+); SB(+); RST(-); ST(-)	2	5	1	5	4	5
PA(+); SB(-); RST(+); ST(-)	1	7	-	7	7	7
PA(-); SB(+); RST(-); ST(+)	3	4	1	4	3	4
PA(-); SB(+); RST(-); ST(-)	15	7	1	7	5	8
PA(-); SB(-); RST(-); ST(+)	18	7	1	7	5	9
PA(-); SB(+); RST(+); ST(+)	2	7	0	7	7	7
PA(+); SB(-); RST(-); ST(-)	14	8	1	8	6	9
PA(-); SB(-); RST(-); ST(-)	23	7	2	8	1	9

** **PA:** Physical Activity, **SB:** Sedentary Behavior, **RST:** Recreational Screen Time, **ST:** Sleep Time*

When Table 3 is examined, when the effects of compliance with the 24-hour movement guideline on menstrual pain score according to VAS pain results are examined, there is a similarity in the VAS scores of those who comply with the 24-hour movement guideline or those who do not comply with at least one of them, while the VAS pain scores of those who do not comply with the guideline or those who comply with at least one of them are high.

Table 4. Effect of the participants who complied and did not comply with the physical activity guideline on the PMS scale subscales

PMS Scale Subdimensions	PA Guidelines Compliant Participants		PA Guidelines Non-Compliant Participants		
	x̄ ± SD	**Med (Min-Max)**	**x̄ ± SD**	**Med (Min-Max)**	**p**
Total Score	108 ± 20	101 (78-163)	155 ± 18	154 (90-188)	**<0,001 Z***
Depressive Mood	18 ± 4	17 (11-27)	25 ± 4	26 (14-35)	**<0,001 Z***
Anxiety	15 ± 4	14 (8-23)	20 ± 3	20 (12-27)	**<0,001 Z***
Fatigue	15 ± 3	14 (9-22)	21 ± 3	21 (12-27)	**<0,001 Z***
Irritability	13 ± 3	12 (6-19)	18 ± 3	18 (10-24)	**<0,001 Z***
Depressive Thoughts	17 ± 4	16 (8-29)	25 ± 4	25 (15-35)	**<0,001 Z***
Pain	8 ± 2	7 (4-13)	11 ± 2	12 (4-15)	**<0,001 Z***
Appetite Changes	8 ± 2	7 (6-14)	12 ± 2	12 (6-15)	**<0,001 Z***
Sleep Changes	7 ± 2	6 (3-12)	11 ± 2	11 (5-15)	**<0,001 Z***
Bloating	9 ± 2	10 (5-14)	12 ± 2	12 (5-15)	**<0,001 Z***

***Z:** Mann-Whitney U Test, ***:** Statistical Significant p<0,05*

When Table 4 is examined, when the effect of the participants who complied and did not comply with the physical activity guideline on the sub-dimensions of the PMS scale is examined, significant differences were found in all sub-dimensions between the participants who complied and did not comply with the physical activity guideline.

Table 5. Effect of the participants who complied and did not comply with the sedentary behaviour directive on the PMS scale subscales

PMS Scale Subdimensions	SB Guidelines Compliant Participants		SB Guidelines Non-Compliant Participants		
	x̄ ± SD	Med (Min-Max)	x̄ ± SD	Med (Min-Max)	p
Total Score	124 ± 28	118 (78-182)	158 ± 20	160 (90-188)	**<0,001 Z***
Depressive Mood	20 ± 5	20 (11-32)	25 ± 4	26 (16-35)	**<0,001 Z***
Anxiety	17 ± 4	17 (8-24)	21 ± 3	21 (10-27)	**<0,001 Z***
Fatigue	17 ± 4	17 (9-27)	21 ± 4	21 (12-27)	**<0,001 Z***
Irritability	14 ± 4	14 (6-24)	18 ± 3	19 (10-24)	**<0,001 Z***
Depressive Thoughts	19 ± 5	18 (8-32)	26 ± 4	26 (16-35)	**<0,001 Z***
Pain	9 ± 3	8 (4-15)	12 ± 2	12 (4-15)	**<0,001 Z***
Appetite Changes	9 ± 3	9 (6-15)	11 ± 2	12 (6-15)	**<0,001 Z***
Sleep Changes	8 ± 2	9 (3-12)	11 ± 2	11 (5-15)	**<0,001 Z***
Bloating	10 ± 2	11 (5-15)	12 ± 2	12 (5-15)	**<0,001 Z***

Z: *Mann-Whitney U Test,* ****:*** *Statistical Significant p<0,05*

When Table 5 is examined, when the effect of the participants who complied and did not comply with the sedentary behaviour directive on the sub-dimensions of the PMS scale is examined, significant differences were found in all sub-dimensions between the participants who complied and did not comply with the sedentary behaviour directive.

Table 6. The effect on the PMS scale sub-dimensions of participants who did and did not comply with the recreational screen time guideline

PMS Scale Subdimensions	RST Guidelines Compliant Participants		RST Guidelines Non-Compliant Participants		
	x̄ ± SD	Med (Min-Max)	x̄ ± SD	Med (Min-Max)	p
Total Score	109 ± 26	100 (78-165)	141 ± 28	147 (84-188)	**<0,001 Z***
Depressive Mood	17 ± 5	16 (12-32)	23 ± 5	23 (11-35)	**<0,001 Z***
Anxiety	15 ± 3	15 (8-23)	19 ± 4	19 (8-27)	**<0,001 Z***

Fatigue	14 ± 3	13 (9-22)	19 ± 4	20 (11-27)	**<0,001 Z***
Irritability	13 ± 4	12 (9-21)	16 ± 4	17 (6-24)	**<0,001 Z***
Depressive Thoughts	18 ± 5	16 (12-30)	22 ± 6	23 (8-35)	**0,004 Z***
Pain	8 ± 3	7 (4-14)	10 ± 3	11 (6-15)	**<0,001 Z***
Appetite Changes	8 ± 2	7 (6-14)	10 ± 3	11 (6-15)	**<0,001 Z***
Sleep Changes	7 ± 2	6 (3-11)	10 ± 3	10 (3-15)	**<0,001 Z***
Bloating	9 ± 2	9 (5-12)	11 ± 2	12 (6-15)	**<0,001 Z***

***Z:** Mann-Whitney U Test, ***:** Statistical Significant p<0,05*

When Table 6 is examined, when the effect of the participants who comply with the recreational screen time directive and those who do not comply with the recreational screen time directive on the sub-dimensions of the PMS scale is examined, significant differences were found in all sub-dimensions between the participants who comply and do not comply with the recreational screen time directive.

Table 7. Effect of the participants who complied and did not comply with the sleep instruction on the PMS scale sub-dimensions

PMS Scale Subdimensions	**ST Guidelines Compliant Participants**		**ST Guidelines Non-Compliant Participants**		
	x̄ ± SD	**Med (Min-Max)**	**x̄ ± SD**	**Med (Min-Max)**	**p**
Total Score	123 ± 28	111 (78-182)	150 ± 25	153 (89-188)	**<0,001 Z***
Depressive Mood	20 ± 5	18 (11-32)	24 ± 4	25 (14-35)	**<0,001 Z***
Anxiety	16 ± 4	17 (8-23)	20 ± 4	21 (11-27)	**<0,001 Z***
Fatigue	17 ± 4	16 (9-27)	20 ± 4	21 (12-27)	**<0,001 Z***
Irritability	14 ± 4	13 (6-24)	17 ± 3	18 (10-24)	**<0,001 Z***
Depressive Thoughts	19 ± 5	18 (8-32)	24 ± 5	25 (13-35)	**<0,001 Z***
Pain	9 ± 3	8 (4-15)	11 ± 2	11 (4-15)	**<0,001 Z***
Appetite Changes	9 ± 3	9 (6-15)	11 ± 3	11 (6-15)	**<0,001 Z***
Sleep Changes	8 ± 3	8 (3-15)	10 ± 2	10 (5-15)	**<0,001 Z***
Bloating	10 ± 2	10 (5-15)	12 ± 2	12 (5-15)	**<0,001 Z***

***Z:** Mann-Whitney U Test, ***:** Statistical Significant p<0,05*

When Table 7 is examined, when the effect of the participants who complied and did not comply with the sleep duration directive on the sub-dimensions of the PMS scale is examined, significant differences were found in all sub-dimensions between the participants who complied and did not comply with the sleep duration.

Table 8. The effect of complying with the 24-hour movement guidelines, complying with at least one of them, and not complying with any of the guidelines on the PMS scale subscales

PMS Scale Subdimensions	1		2		3		p	Post-hoc
	x̄ ±SD	Med (Min-Max)	x̄ ±SD	Med (Min-Max)	x̄ ± SD	Med (Min-Max)		
Total Score	97 ± 8	99 (78-106)	133 ± 27	141 (84-182)	167 ± 13	168 (140-188)	**<0,001**€*	1-2, 1-3, 2-3
Depressive Mood	15 ± 2	16 (12-17)	22 ± 5	22 (11-32)	27 ± 4	26 (18-35)	**<0,001**€*	1-2, 1-3, 2-3
Anxiety	14 ± 2	14 (8-17)	18 ± 4	18 (8-24)	22 ± 2	22 (18-27)	**<0,001**€*	1-2, 1-3, 2-3
Fatigue	13 ± 2	13 (9-15)	18 ± 4	18 (11-27)	23 ± 2	22 (18-27)	**<0,001**€*	1-2, 1-3, 2-3
Irritability	11 ± 2	11 (9-14)	15 ± 4	16 (6-24)	19 ± 3	19 (15-24)	**<0,001**€*	1-2, 1-3, 2-3
Depressive Thoughts	15 ± 2	16 (12-18)	21 ± 5	22 (8-32)	27 ± 3	27 (21-35)	**<0,001**€*	1-2, 1-3, 2-3
Pain	6 ± 1	6 (4-8)	10 ± 3	10 (4-15)	12 ± 2	12 (9-15)	**<0,001**€*	1-2, 1-3, 2-3
Appetite Changes	7 ± 1	6 (6-10)	10 ± 3	10 (6-15)	12 ± 2	12 (9-15)	**<0,001**€*	1-2, 1-3, 2-3
Sleep Changes	6 ± 1	6 (3-9)	9 ± 2	9 (3-15)	12 ± 2	12 (7-15)	**<0,001**€*	1-2, 1-3, 2-3
Bloating	9 ± 2	9 (5-11)	11 ± 2	11 (5-15)	13 ± 2	13 (8-15)	**<0,001**€*	1-2, 1-3, 2-3

1: *Complying with All Guidelines,* ***2:*** *Not Complying with at Least One,* ***3:*** *Not Complying with Any Guidelines;*

€: *Kruskall Wallis H testi;* ****:*** *Statistical Significant p<0,05*

When Table 8 is examined, significant differences were found between all groups when the effects of those who followed the 24-hour movement guidelines, those who followed at least one of them and those who did not follow any guidelines on the sub-dimensions of the PMS scale were examined.

DISCUSSION

The etiology of PMS is poorly understood, but it is a neuroendocrine disorder in which neurological sensitization contributes to regular changes in sex hormone levels during the menstrual cycle. Hormonal fluctuations might influence the activity of neurotransmitters or neuropeptides in the brain, resulting in the emotional and physical symptoms linked to PMS (Daley, 2009; Yang et al., 2024). Adhering to 24-hour movement guidelines to reduce PMS symptoms includes movement behaviors that are beneficial, including physical activity, sleep, sedentary behaviors and screen time management. This study found that women who followed the 24-hour movement guideline were less likely to experience PMS symptoms compared to women who did not follow the guideline. Physical activity, which is effective in reducing PMS symptoms, has a protective effect on PMS and reduces adverse conditions (Dozsa-Juhasz et al., 2023; Samadi et al., 2013). Physical activity can enhance the secretion of endogenous opioids by increasing the release of endorphins and adrenal cortisol from the anterior pituitary gland (Haghighi et al., 2015; Nam & Cha, 2020). Studies have shown that physical activity can have a positive effect on PMS by influencing processes both psychologically and physiologically (Haghighi et al., 2015). This includes increasing the levels of endorphins in the body, which are known to have mood-enhancing effects. Physical activity also has the potential to regulate hormone levels in the hypothalamic-pituitary-gonadal axis, which is involved in the menstrual cycle (Kiloatar & Kurt, 2024). Additionally, it can improve muscle oxygenation and help regulate mental and emotional well-being (Yesildere Saglam & Orsal, 2020). Regular exercise has been found to have a reducing effect on pain, fatigue, mood disorders and water retention, which are physical symptoms of PMS (Sanchez et al., 2023). Endorphins secreted during exercise reduce stress levels by promoting positive thoughts and emotions, thereby alleviating menstrual symptoms (Vaghela et al., 2019). In addition, exercise increases mental efficiency and a sense of happiness by distracting attention from disturbing and negative thoughts (Mohebbi-Dehnavi et al., 2017). Leptin regulates emotional behaviour and is significantly higher in women with PMS relative to women without PMS. Elevated circulating leptin levels are associated with PMS-related psychosocial problems. Multiple studies have shown that physical activity reduces blood leptin levels by about 30% to 34%, hence contributing to the relief of PMS-related behavioural symptoms (Sabaei et al., 2015; Vaghela et al., 2019). In general, exercise is beneficial for women experiencing premenstrual discomfort and is a highly recommended activity (Sanchez et al., 2023).

Another study found that women with high levels of physical activity (PA) had lower premenstrual syndrome (PMS) symptoms (physical and psychological) (Kawabe et al., 2022). A meta-analysis showed that regular physical activity can alleviate PMS-related (psychological, somatic and behavioural symptoms) (Pearce et al., 2020). A study conducted by Yang et al. (2024) found that high levels of physical activity were strongly associated with PMS in female university students. The study conducted by Czajkowska et al. (2019) reveals an intriguing correlation between increased levels of physical exercise in women and higher levels of premenstrual syndrome (PMS) compared to those who engage in infrequent or no exercise. There may be several possible reasons for this paradoxical situation: high-intensity and prolonged exercise disrupts hormonal balance by causing excessive secretion of stress hormones (such as cortisol), excessive exercise creates an energy imbalance, psychosocial stressors related to performance pressure and body image increase premenstrual symptoms, different types of exercise cause hormonal and physiological responses, and individual differences. These factors may explain the complex effects of exercise on premenstrual symptoms (Czajkowska et al., 2019). Gaikwad and Kanase (2022) found in their study that %73.3 of the general population engaged in sedentary occupations, and %36 exhibited severe physical symptoms of PMS. Women working in sedentary occupations have more prominent physical symptoms than psychological and behavioural symptoms.

Sleep problems are a typical symptom of PMS and lead to a reduced quality of life (Baker et al., 2012b). A relationship may exist between sleep throughout various periods of the menstrual cycle and fluctuations in body temperature as well as the intensity of premenstrual symptoms. Increased temperature during the luteal phase may be associated with poorer sleep quality and reduced duration of REM sleep (Lamarche et al., 2007). In their study, Baker et al. (2012a) showed that women experiencing premenstrual syndrome (PMS) reported inferior sleep quality when they did not have objectively measured bad sleep according to polysomnography. Anxiety significantly impacts perceptions of sleep quality, suggesting that better treatment of mood symptoms in women with severe PMS might lead to improved perceived sleep quality. In another study, it is known that inadequate sleep quality is highly likely to cause dysmenorrhoea and PMS in adolescents, and menstrual symptoms and discomfort are known to cause low sleep quality (Jeong et al., 2023).

A study examining screen time revealed that addiction to social media significantly contributed to the exacerbation of premenstrual syndrome symptoms and the deterioration of sleep quality. Additionally, an association was seen between social media addiction and symptoms of premenstrual syndrome. As social media addiction levels escalated, there was a concomitant rise in the average scores for melancholic thoughts, anxiety, irritability, and depressed mood subscales (Özşahin et al., 2023). Co-sleeping with a small screen, having a television in the bedroom, and increased screen usage has been linked to reduced duration of sleep (Falbe et al., 2015; Hale & Guan, 2015; Madigan et al., 2022). In another study, social media can alleviate psychological factors such as premenstrual distress and stress by promoting accessibility and connections to support healthy living (Haywood et al., 2007).

Our study indicated that the 24-hour movement recommendation also impacts PMS. Regular physical activity, sufficient and high-quality sleep, limited sedentary behaviors, and decreased screen time are crucial in mitigating the intensity of premenstrual symptoms. Within this structure, adhering to the 24-hour movement guidelines provides a comprehensive strategy for managing premenstrual symptoms, and it is crucial to incorporate these behaviors into one's daily life.

CONCLUSION

This study reveals that women are less likely to experience PMS symptoms by following 24-hour movement guidelines. With this study, it is very important to increase the level of physical activity during the day, reduce sedentary behaviors, get enough sleep and pay attention to the time spent connected to the screen to minimize PMS symptoms.

Ethical Statement

The study was conducted in accordance with the principles of the Declaration of Helsinki. All participants signed the informed consent form. Ethics committee approval was obtained by 'Ataturk University Rectorate Dean of the Faculty of Sports Sciences' with the ethics committee decision dated 18.07.2024, session 2024/7 and numbered 76.

Author Contributions

Working planning: BŞ; Data collection: BŞ; Data analysis: BŞ; Literature review: BŞ; Writing: BŞ.

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