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Investigation of the Relationship between Physical Activity Levels and Menstrual Symptoms in Healthy Women

Sağlıklı Kadınlarda Fiziksel Aktivite Seviyesi ve Menstrual Semptomlar Arasındaki İlişkinin İncelenmesi

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ABSTRACT

Objective: This study was conducted to investigate relationship between physical activity levels and menstrual symptoms in healthy women.

Materials and Methods: Healthy women with regular menstruation (n=133, 21.80±2.45 years) included in current study. In the first three days of menstrual cycle, severity of menstrual pain (Visual Analog Scale), menstrual symptoms (Menstruation Symptom Scale (MSS)), and physical activity levels (Recent Physical Activity Questionnaire) were evaluated in these women.

Results: Mean duration of women's menstruation was 5.95±1.68 days, menstrual pain score was 6.22±2.82, total MSS score was 3.36±0.76, and total physical activity score (PAS) was 26.08±26.93 hours*day*MET. There were significant positive correlations between domestic activities PAS and the score of menstrual pain symptoms and between duration of menstruation and pain scores and mean scores on total MSS, negative effects/somatic complaints, menstrual pain symptoms, and coping methods ($p<0.05$).

Conclusion: As menstruation duration, pain of menstruation and physical domestic activities increased in women with regular menstruation, the severity of symptoms increased. Therefore, the effects of methods reducing menstrual symptoms should be investigated in further studies. We recommend that women reduce their physical activities at home during menstruation, support this process with relaxation practices, and continue their physical activities after menstruation period is over.

Keywords: Menstrual cycle, menstrual symptoms, pain, physical activity

ÖZ

Amaç: Bu çalışmada sağlıklı kadınlarda fiziksel aktivite seviyeleri ve menstrual semptomlar arasındaki ilişkiyi araştırmak amaçlandı.

Materyal ve Metot: Bu çalışmaya düzenli adet gören sağlıklı kadınlar (n=133, 21,80±2,45 yıl) dahil edildi. Bu kadınlarda menstrual döngünün ilk üç günü içerisinde menstrual ağrının şiddeti (Görsel Analog Skalası), menstrual semptomlar (Menstruasyon Semptom Ölçeği (MSÖ)) ile fiziksel aktivite seviyesi (Yakın Zamanlı Fiziksel Aktivite Anketi) değerlendirildi.

Bulgular: Kadınların ortalama menstruasyon süresi 5,95±1,68 gün, menstruasyon ağrısı 6,22±2,82 puan, toplam MSÖ puanı ise 3,36±0,76 ve toplam fiziksel aktivite puanı (FAP) 26,08±26,93 saat*gün*MET'ti. Ev aktiviteleri FAP ile menstrual ağrı belirtileri puanları arasında ve menstruasyon süresi ve ağrı puanı ile toplam MSÖ, negatif etkiler/somatik yakınmalar, menstrual ağrı belirtileri ve baş etme yöntemleri puanları arasında pozitif yönde anlamlı korelasyon vardı ($p<0,05$).

Sonuç: Çalışmamızın sonuçlarına göre kadınlarda menstruasyon süresi, ağrısı ve ev içinde yapılan fiziksel aktiviteler arttıkça menstrual döneme ait semptomların şiddeti de artmaktadır. Bu nedenle menstrual semptomları azaltmaya yönelik yöntemlerin etkileri ileri çalışmalarda araştırılmalıdır. Kadınların menstruasyon dönemlerinde ev içindeki fiziksel aktivitelerini azaltarak gevşemeye yönelik uygulamalarla bu süreci desteklemeleri, menstruasyon dönemi bittikten sonra da fiziksel aktivitelerini sürdürmelerini önermekteyiz.

Anahtar Kelimeler: Ağrı, fiziksel aktivite, menstrual semptomlar, menstrual siklus

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INTRODUCTION

Menstruation, which is seen as a symbol of the transition to womanhood in girls, is the beginning of an important process that affects women, their families and societies due to the accompanying symptoms.[1] There may be different symptoms that occur during or before the menstrual phase of a menstrual cycle,[1] which is a normal physiological event due to changes in sex hormone levels.[2] Generally, menstrual symptoms are classified as dysmenorrhea, which is associated with menstrual-related pain symptoms, or premenstrual syndrome (PMS), which is associated with emotional or psychological symptoms.[3] The PMS is defined as a combination of symptoms that begin within five days before menstruation and disappear within four days after the menstrual phase. These symptoms can be grouped as somatic and affective. Affective symptoms include depression, tantrums, irritability, anxiety, and social isolation while somatic symptoms include breast tenderness, abdominal bloating, headache, and extremity edema.[3] Due to medical and social results of all these symptoms and dysmenorrhea,[1] menstrual symptoms may afflict progress of education life, daily living activities, and social activities in women which reduce their quality of life.[4]

Although it is commonly known that menstruation may restrict daily living of women,[1,4] some research papers in the literature have demonstrated that hormone fluctuations occurring in the menstrual period may have no considerable effect on exercise performance, maximal oxygen consumptions, heart and lung response to exercise or muscle contractile characteristics in female athletes with regular menstrual cycle.[5,6] On the other hand, doing regular physical activity improves mental health by reducing anxiety, depression, and negative mood.[7] People with a high level of physical activity have a lower incidence of anxiety and depression than those with a low level of physical activity.[8,9] Studies have shown that physical activity is an effective treatment for anxiety and depression, as well.[10] That is, being physically active is an important key to prevent mental health disorders and improve existing mental health problems. However, the association between these menstrual symptoms and exercise and/or physical activities in sedentary women has not been studied to our knowledge until now.

Based on this knowledge, being more physically active may be associated with fewer menstrual symptoms in women. However, this issue has not yet been clarified, to date. Therefore, this study was conducted to investigate the relationship between physical activity levels and menstrual symptoms in healthy women.

MATERIALS AND METHODS

Ethics Committee Approval: Approval of the ethics committee of Sivas Cumhuriyet University Non-Interventional Clinical Research was obtained for this cross-sectional study (date: 27.04.2022; decision number: 2022-04/20). Consent of the women who volunteered to participate in the study was obtained. The study was conducted in accordance with the Declaration of Helsinki.

Studying Group: The healthy women included in the study were selected on a voluntary basis among those who were aged ≥18 years and had a regular menstrual cycle. Exclusion criteria were having any orthopedic, neurological, or cardiovascular system diseases that prevent physical activity, being pregnant, having any accident or trauma in the last six months that prevents physical activity or having a history of injury to the lower extremities, and having used oral contraceptives or other hormone medications at least three months before participating in the study.[11]

Data Collection: The healthy women were reached through social media and close circles. The link to an online questionnaire created on Google Forms was sent to the women who met the inclusion criteria via e-mail or messaging applications on their mobile phones (SMS, WhatsApp, etc.). The women participating in the study were evaluated only once during their menstrual phase, and the assessment was made within the first three days of the menstrual cycle. General participant data (age, height, body weight, education, marital status, presence of pregnancy status, presence of previous illness or surgery, medications used and their duration, presence of oral contraceptives or other hormonal drugs usage, sleep duration, smoking status, status of cigarette and alcohol usage, the presence of regular menstruation, and menstrual cycles duration) were recorded.

Assessment of Pain: The visual analog scale (VAS) was used to determine the severity of menstrual pain in women.[12] The degree of pain felt by women during their last menstrual period was questioned and the pain severity score they determined was recorded.

Assessment of Menstrual Symptoms: The Menstruation Symptom Scale (MSS) was used to evaluate the menstrual symptoms of the women participating in our study. This scale was developed by Chesney and Tasto in 1975. Turkish validity and reliability study was conducted by Güvenç et al. in 2014.[13] The scale consists of 22 items and has a five-point Likert -type structure. Items 1-13 belong to the “negative effects/somatic complaints” sub-dimension, 14-19 to the “menstrual pain symptoms” sub-dimension, and 20-22 to the "coping methods" sub-dimension. The MSS score is found by calculating the mean of the

total scores of the items on the scale. A high mean score indicates an increase in the severity of menstrual symptoms. The score of each sub-dimension is calculated.[13,14]

Assessment of Physical Activity Level: The Recent Physical Activity Questionnaire (RPAS) was used to evaluate physical activity. The validity and reliability studies of the questionnaire in Turkey were carried out by Daşdemir et al.[15] RPAS questions physical activity in the past four weeks. The questionnaire consists of a total of nine questions covering four areas.[16,17] The first part is about domestic activities, the second part is about activities at work, and the third part is about leisure activities. All activities were classified according to their intensity as sedentary, mild, moderate, and vigorous.[17] The physical activity score (PAS) in the form of energy consumption for four different areas (home, work, transportation, and leisure) is calculated by multiplying the duration of each activity (hours/day) with the MET value corresponding to each activity. Total energy consumption (total PAS) is calculated by summing the energy consumption evaluated for each area.[16]

Statistical Analyses: Sample size of the study was calculated using the Raosoft sample size calculator software (http://www.raosoft.com/samplesize.html., access date: April 21, 2022). Based on the estimated population (82 individuals with low physical activity levels) and response distribution as proportion of women with premenstrual syndrome to 47.6% who do low-intensity physical activity, the required sample size was calculated as at least 64 women based on a confidence level of 90% and a 5% type-1 margin of error.[18]

Statistical analyses were performed on SPSS 15.0 software package. The conformity of all variables to the normal distribution was investigated using visual (histogram and probability plots) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk tests). Descriptive analyses were presented using frequency (n) and percentage (%) values for categorical variables, median and interquartile range (IQA) for non-normally distributed variables and mean and standard deviation (x±sd) values for normally distributed variables. Independent samples t-test (student t-test) was used to compare the variables that showed a normal distribution, and the Mann-Whitney U test was used to compare the variables that did not. The Chi-square test was used to compare the categorical variables.

The relationships between non-normally distributed variables were determined using Spearman correlation, and the relationships between normally distributed variables were determined using the Pearson correlation analysis method. In the statistical analysis, the probability of Type-1 error was determined as $p<0.05$.

RESULTS

Demographic and descriptive characteristics of 133 healthy women included in the study are given in Table 1. The mean menstrual duration of the women was 5.95±1.68 days, menstrual pain score was 6.22±2.82 (Table 1).

Table 1. Demographic and descriptive characteristics of participants.

		Participants (n=133) x±sd / median (IQR)
Age (years)		21.80±2.45
Height (m)		1.65±0.06
Body weight (kg)		58.78±9.17
Body mass index (kg/m^2)		21.52±3.04
Sleep time (hours)		7.50±1.27
Regular menstruation cycle time (day/month)		26.60±4.78
Period of regular menstruation (days)		5.95±1.68
Menstrual pain (VAS, 0-10)		6.22±2.82 / 7 (4)
Education level (n (%))	**High school**	5 (3.76%)
	University	125 (94%)
	Master's degree	1 (0.75%)
	Doctorate	2 (1.5%)
Marital status (n (%))	**Single**	130 (97.7%)
	Married	3 (2.3%)
Presence of pregnancy (n (%))		0
Those who gave birth (n (%))		0
Smokers (n (%))		37 (27.8%)
Those with chronic disease (n (%))		15 (11.3%)
Those who have undergone surgery (n (%))		2 (1.5%)

m: Meters; kg: Kilograms; VAS: Visual analogue scale; n: Frequency; %: Percent; x: Mean, sd: Standard deviation; IQR: Interquartile range.

As shown in Table 2, total MSS score was 3.36±0.76, and total PAS was 26.08±26.93 hours*day*MET.

Table 3 explains that there was a statistically significant positive and low correlation between women's domestic activities PAS and the scores of menstrual pain symptoms ($p<0.05$), but there was no statistically significant correlation between other total physical activity and physical activity subscale scores and the mean scores on the total MSS and its subscales ($p>0.05$).

As presented in Table 4, there was a statistically significant negative and low correlation between women's mean duration of sleep and total PAS, work activity PAS, and scores for the duration of mild activity ($p<0.05$). Moreover, there was a statistically significant positive correlation between the duration of menstruation and mean menstruation pain scores and mean scores on the total MSS, and negative effects/somatic complaints, menstrual pain symptoms, and coping methods subscales (Table 4, $p<0.05$).

Table 2. Physical activity level and menstrual symptoms of participants.

	Participants (n=133) x±sd /median (IQR)
Total PAS (hour*day*MET)	26.08±26.93 / 18.71 (25.66)
Home activity PAS (hour*day*MET)	4.66±4.08 / 3.37 (4.74)
Business activity PAS (hour*day*MET)	8.38±13.03 / 0 (14)
Leisure activity PAS (hour*day*MET)	12.72±23.34 / 6.52 (13.82)
Transportation activity PAS (hour*day*MET)	0.32±1.52 / 0 (0)
Sedentary activity duration (hours)	5.18±3.02 / 4.79 (4.25)
Light-intensity activity duration (hours)	1.07±2.02 / 0.01 (1.12)
Moderate activity duration (hours)	0.99±1.27 / 0.49 (1.19)
Duration of vigorous activity (hours)	0.11±0.39 / 0.01 (0.06)
MSS total score (1-5)	3.36±0.76
Negative effects/somatic complaints (1-5)	3.34±0.75
Menstrual pain symptoms (1-5)	3.55±0.89 / 3.67 (1)
Coping methods (1-5)	3.07±1.29 / 3.33 (2.17)

PAS: Physical activity score; MET: Metabolic equivalent; MSS: Menstruation symptom scale; n: Frequency; x±sd: Mean±Standard deviation; IQR: Interquartile range.

Table 3. The relationship between the scores of the Recent Physical Activity Questionnaire and Menstruation Symptom Scale of participants.

	MSS total score (1-5)		**Negative effects/somatic complaints (1-5)**		**Menstrual pain symptoms (1-5)**		**Coping methods (1-5)**	
	r	**p**	**r**	**p**	**r**	**p**	**r**	**p**
Total PAS (hour*day*MET)	0.118	0.177	0.069	0.431	0.135	0.122	0.119	0.173
Home activity PAS (hour*day*MET)	0.012	0.891	-0.022	0.803	**0.190**	**0.028***	-0.053	0.547
Business activity PAS (hour*day*MET)	0.103	0.236	0.077	0.377	0.015	0.865	0.157	0.072
Leisure activity PAS (hour*day*MET)	0.018	0.833	-0.011	0.896	0.057	0.515	-0.019	0.828
Transportation activity PAS (hour*day*MET)	0.027	0.756	0.003	0.968	-0.044	0.614	0.122	0.160
Sedentary activity duration (hours)	-0.115	0.188	-0.109	0.213	0.021	0.809	-0.156	0.074
Light-intensity activity duration (hours)	0.102	0.244	0.112	0.201	0.020	0.816	0.111	0.205
Moderate activity duration (hours)	0.035	0.690	-0.005	0.957	0.079	0.369	0.014	0.876
Duration of vigorous activity (hours)	0.037	0.672	0.038	0.664	0.114	0.190	-0.062	0.477

PAS: Physical activity score; MET: Metabolic equivalent; MSS: Menstruation symptom scale; r: Correlation coefficient; p: p value; Spearman Correlation test: *: p<0;05.

Table 4. The relationship between sleep duration, physical activity level and menstrual symptoms in partici-

	Sleep time (hours)		Period of menstruation (days)		Menstrual pain (VAS, 0-10)	
	r	p	r	p	r	p
Total PAS (hour*day*MET)	**-0.280**	**0.001**[*]	0.141	0.105	0.167	0.054
Home activity PAS (hour*day*MET)	0.010	0.905	0.001	0.996	-0.035	0.693
Business activity PAS (hour*day*MET)	**-0.293**	**0.001**[*]	-0.009	0.918	0.144	0.099
Leisure activity PAS (hour*day*MET)	-0.080	0.361	0.166	0.056	0.070	0.426
Transportation activity PAS (hour*day*MET)	-0.149	0.087	0.081	0.356	0.110	0.208
Sedentary activity duration (hours)	-0.058	0.511	-0.152	0.081	-0.163	0.061
Light-intensity activity duration (hours)	**-0.205**	**0.018**[*]	0.128	0.141	0.071	0.419
Moderate activity duration (hours)	-0.148	0.089	0.162	0.063	0.083	0.340
Duration of vigorous activity (hours)	0.055	0.527	0.124	0.155	-0.047	0.594
MSS total score (1-5)	0.043	0.624	**0.344**	**0.001**[#]	**0.651**	**0.001**[*]
Negative effects/somatic complaints (1-5)	0.066	0.448	**0.309**	**0.001**[#]	**0.494**	**0.001**[*]
Menstrual pain symptoms (1-5)	0.012	0.892	**0.273**	**0.001**[*]	**0.548**	**0.001**[*]
Coping methods (1-5)	-0.031	0.726	**0.224**	**0.009**[*]	**0.702**	**0.001**[*]

PAS: Physical activity score; MET: Metabolic equivalent; MSS: Menstruation symptom scale; r: Correlation coefficient; p: p value; Pearson Correlation test; [#]: $p<0.05$; Spearman Correlation test; [*]: $p<0.05$.

DISCUSSION AND CONCLUSION

As a result of the study, in which we investigated the relationship between physical activity levels and menstrual symptoms in healthy women, there was a positive relationship between domestic activities PAS and scores of menstrual pain symptoms, a negative relationship between sleep duration and total PAS, work activity PAS, and scores for the duration of mild activity, and a positive relationship between the duration of menstruation and mean scores for menstruation pain and mean scores on the total MSS, negative effects/somatic complaints, menstrual pain symptoms, and coping methods subscales.

Exercise is known to act as a non-specific analgesic by improving pelvic blood circulation and stimulating the release of beta-endorphins.[19] In a study by Salehi et al.[20], the effects of eight-week Pilates exercise on menstrual pain and its duration were investigated in women with and without primary dysmenorrhea. In conclusion, it was reported that exercise training improved the severity and duration of pain in women with primary dysmenorrhea.[20] In another study involving women with premenstrual symptoms, the effects of aerobic exercise training and yoga exercises applied regularly for one month on pain and premenstrual symptoms were investigated. It was found that both pain intensity and premenstrual symptoms decreased in women in both exercise groups. However, yoga exercises were found to be more effective in relieving premenstrual symptoms than aerobic exercise training.[21] No exercise program was applied to the women included in our study; only the amount of physical activity in the last month was questioned. As a result of our study, it was found that as the amount of physical activity performed by healthy women at home increased, menstrual pain increased, as well. Although our results look different from those of the literature, the effects of regular exercise have been questioned in the literature. Since exercise and physical activity are different concepts, it is normal for the results to be different. Menstrual pain may have increased due to the wrong posture and prolonged housework. Studies in the literature have examined the effects of exercise performed by specialist health professionals. Including domestic activities in the content of physical activity counseling in public health protection programs and providing education on doing housework appropriately and within certain hours can be a solution to this problem. On the other hand, in a study, in which the relationship between physical activity levels and premenstrual symptoms in women was directly questioned, university students were evaluated. It was reported that the physical activity levels of women with the premenstrual syndrome were lower than those of healthy women and that the incidence of premenstrual syndrome decreased as the level of physical activity increased.[22] In a randomized controlled study examining the effect of swimming on premenstrual symptoms, premenstrual symptoms were evaluated with the help of a questionnaire. The study was concluded that premenstrual symptom severity in the swimming group was lower than in the control group.[23] In a systematic review, it was emphasized that the exercise may be beneficial in alleviating symptoms as an effective method for the treatment of premenstrual syndrome.[24] In another study examining the effect of aerobic exercise on the physical symptoms of premenstrual syndrome, the intervention group performed exercise for 20 minutes per a day, 3 days per a week and totally 8 weeks. As a result, it was determined that there was a significant decrease in the severity of physical symptoms such as bloating, nausea, vomiting, hot flashes, and increased appetite in the aerobic exercise group. Therefore, it was con-

cluded that aerobic exercise is a valuable way to treat the physical symptoms of premenstrual symptoms.[25] In our study, a physical activity questionnaire, which is used to do a detailed evaluation of women's domestic, workplace, and leisure activities and is longer than its counterparts, was used, and no correlation could be found between physical activities other than domestic activities and menstrual symptoms. The reason for this difference may be because the evaluation methods used in this study[22] were employed to evaluate physical activities more generally and the sample size was different. In another study, the physical activity levels of women with and without primary dysmenorrhea were questioned by using the International Physical Activity Questionnaire, and it was found that the physical activity levels of women with primary dysmenorrhea were significantly higher.[26] These results support our results that as the physical domestic activities increase, the symptoms also increase. The high amount of physical activity may cause women to do strenuous uncontrolled activities during the menstrual period. However, exercises to be done with the consultancy of a specialist can help reduce the severity of menstrual pain, as stated in the literature, as it will provide controlled exercise. In the literature, it has been stated that women need to work more for less total work than men depending on their body mass, and it is emphasized that women have less capacity than men to complete the upper extremity exercise protocol.[27] The fact that housework activities involve more upper extremity movements by nature may also cause women to have difficulty and increase menstrual symptoms.

Day 1 to 5 of the menstrual cycle is called menstruation, and the duration of menstruation is variable. The normal duration of menstruation is 3-5 days.[28] In a study on the relationship between menstruation duration and pain and menstrual symptoms in the literature, it was found that women with a longer menstrual period or more pain had higher depressive mood changes and eating tendencies.[29] Similarly, in another study involving women, it was reported that women with prolonged menstruation had more pain and experienced more menstrual symptoms.[30] Consistent with the results of these studies, in our study, women with longer menstrual duration and more pain experienced more menstrual symptoms. We think that strategies to be developed to reduce pain will also play a role in reducing menstrual symptoms.

To reach more individuals in current study, the evaluations were made within the first three days of the menstrual cycle as in similar studies in the literature. However, it would be better if all women included in the study were evaluated on the same day of the menstrual cycle. This may be a limitation of our study.

In conclusion, menstruation, which is a natural physiological process, is perceived as a different experience by every woman. For this process to be positive and smooth, we recommend that women reduce their physical activities at home during menstruation, support this process with relaxation practices, and continue their exercise programs after the menstruation period is over in line with the recommendations of health professionals who are knowledgeable about exercise. In future studies, the effect of methods that reduce menstrual symptoms should be investigated in detail.

Ethics Committee Approval: Ethical approval for the study was obtained from the Non-Interventional Clinical Research Ethics Committee of Sivas Cumhuriyet University (date 27.04.2022; decision number: 2022-04/20). The study was conducted in accordance with the Declaration of Helsinki.

Conflict of Interest: No conflict of interest was declared by the authors.

Author Contributions: Concept - SSK; Supervision – SSK, GB; Materials – SSK; Data Collection and/ or Processing – SSK, GB; Analysis and/ or Interpretation – SSK, GB; Writing – SSK, GB.

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