

Examination of the Effect of the Pandemic on Physical Activity and Dysmenorrhea

Pandeminin Fiziksel Aktivite ve Dismenoreye Etkisinin Birlikte İncelenmesi

Deniz TUĞYAN AYHAN^{1*}, Ayşegül YILDIZ², Gülşah BEKTAŞ³, Buket BÜYÜKTURAN⁴, Öznur BÜYÜKTURAN⁵, Sezen VAROL⁶.

¹Lecturer, Cappadocia University, School of Health Sciences, Department of Physiotherapy and Rehabilitation, Nevşehir, Turkey, deniz.ayhan@kapadokya.edu.tr ORCID: 0000-0002-4374-6115

²Asist. Prof. Cappadocia University, School of Health Sciences, Nevşehir, Turkey, aysegul.yildiz@kapadokya.edu.tr ORCID: 0000-0002-5526-5917

³Lecturer, Cappadocia University, Cappadocia Vocational College, Dialysis Program (English), Nevşehir, Turkey, gulsah.bektas@kapadokya.edu.tr ORCID: 0000-0002-4633-6955

⁴Asst. Prof. Kırşehir Ahi Evran University, School of Physical Therapy and Rehabilitation, Kırşehir, Turkey, bukturanoznur@ahievran.edu.tr ORCID: 0000-0001-5898-1698

⁵Asst. Prof. Kırşehir Ahi Evran University, School of Physical Therapy and Rehabilitation, Kırşehir, Turkey, buyukturanoznur@gmail.com ORCID: 0000-0002-1163-9972

⁶Medical Dr, Private Versa Hospital, Obstetrician and Gynecologist, Nevşehir, Turkey sezen.varol@kapadokya.edu.tr ORCID: 0000-0001-5441-0599

***Corresponder author:** Deniz TUĞYAN AYHAN, PT, Lecturer Cappadocia University, School of Physical Therapy and Rehabilitation, Ürgüp, Nevşehir/Turkey

e-mail: deniz.ayhan@kapadokya.edu.tr

GSM:+905442001532

Received: 20/09/2022

Accepted: 18/03/2023

Published Online: 31/03/2023

Abstract

Background: Dysmenorrhoea related with body mass index -less than 20 kg/cm², smoking, early menarche, longer menstrual cycles, irregular menstrual flow and a family history of dysmenorrhoea. On the other hand, the relationship between physical activity level and dysmenorrhoea is still controversial.

Purpose of the study: This study aimed to examine the effect of the pandemic on physical activity and dysmenorrhoea together.

Results: Individuals' severity of dysmenorrhoea, menstrual symptoms, physical activity levels were assessed with "Visual Analogue Scale (VAS)", "Menstruation Symptom Questionnaire (MSQ)", "International Physical Activity Questionnaire (IPAQ)", respectively. Moreover; BMI was calculated. Assessments were carried out twice, before -during the pandemic. The VAS value was 6.23 ± 1.78 before the pandemic, it was 7.20 ± 1.63 during the pandemic. The IPAQ score was 1274.67 ± 1232.26 before the pandemic, it was 902.74 ± 892.33 during the pandemic. While the changes in VAS (t: -3.549, p: 0.001) and IPAQ (t: 2.543, p: 0.013) values before and during the pandemic were statistically significant MSQ (t: -.781, p: 0.437) and BMI (t: -.938, p: 0.351) changes were not statistically significant.

Conclusion: When the severity of dysmenorrhoea and physical activity levels were compared with before the pandemic, a decrease in the level of physical activity and an increase in the severity of dysmenorrhoea were found statistically significant during the pandemic (p<0.05). Although there was an increase in BMI and menstrual symptoms this increase wasn't statistically significant (p> 0.05).

Keywords: Dysmenorrhoea, COVID-19, Physical Activity, Pandemic

Özet

Giriş: Dismenore, vücut kütle indeksinin (VKİ) 20 kg/cm²'den az olması, sigara kullanımı, erken menarş, daha uzun süren menstruasyon, düzensiz siklus ve ailede dismenore öyküsü ile ilişkilidir. Öte yandan fiziksel aktivite düzeyi ile dismenore arasındaki ilişki halen tartışmalıdır.

Amaç: Bu çalışmada pandeminin fiziksel aktivite ve dismenoreye etkisinin birlikte incelenmesi amaçlanmıştır.

Bulgular: Bireylerin dismenore şiddeti, menstrual semptomları, fiziksel aktivite düzeyleri sırasıyla "Vizuel Analog Skala (VAS)", "Menstruasyon Semptom Ölçeği (MSÖ)", "Uluslararası Fiziksel Aktivite Anketi (UFAA)" ile değerlendirildi. Ayrıca katılımcıların VKİ değerleri hesaplandı. Pandemi öncesinde ve döneminde olmak üzere iki kez değerlendirme yapıldı. Pandemi öncesi VAS değeri 6,23 ± 1,78 iken pandemide 7,20 ± 1,63 idi. Pandemi öncesi UFAA skoru 1274,67 ± 1232,26 iken pandemide 902,74 ± 892,33 idi. Pandemi öncesi ve pandemideki VAS (t: -3,549, p: 0,001) ve UFAA (t: 2,543, p: 0,013) değerlerindeki değişim istatistiksel olarak anlamlı iken MSÖ (t: -.781, p: 0,437) ve VKİ (t: -.938, p: 0,351) değerlerindeki değişim istatistiksel olarak anlamlı bulunmadı.

Sonuç: Pandemi öncesi ile pandemi sırasındaki dismenore şiddeti ve fiziksel aktivite düzeyleri karşılaştırıldığında, pandemi sırasında fiziksel aktivite düzeyinde azalma ve dismenore şiddetindeki artış istatistiksel olarak anlamlı bulundu (p<0.05). VKİ ve menstrüel semptomlarda artış olmasına rağmen bu artış istatistiksel olarak anlamlı değildi (p> 0.05).

Anahtar Kelimeler: Dismenore, COVID-19, Fiziksel Aktivite, Pandemi

Cite this article: Tuğyan Ayhan D., Yıldız A., Bektaş G., Büyükturan B., Büyükturan Ö., Varol S. Examination of The Effect of the Pandemic on Physical Activity and Dysmenorrhoea. Turk J Health S. 2023;4:1:X-X.



INTRODUCTION

Dysmenorrhea, a gynecological problem called “painful menstruation”, is frequently observed in women and characterized by severe uterine pain, manifested as a cyclical pain in the lower quadrant of the abdomen during menstruation (1-3). There are two types of dysmenorrhea: primary and secondary. While primary dysmenorrhea occurs without an obvious pathological cause, secondary dysmenorrhea occurs due to pathological causes such as endometriosis and pelvic inflammatory disease (1,4-6). The pain caused by dysmenorrhea is concentrated in the pelvic region, affecting women to varying degrees, causing them to experience labor loss at work and in school (1, 7, 8). A study conducted with school-age girls reported that students’ absenteeism occurred due to dysmenorrhea (9). Working women are reported to experience situations such as not being able to go to work or not working with a good performance at least once a year with a rate of 5%-14% (10). Dysmenorrhea is a common problem among women both in Turkey and in other countries and affects women negatively (11).

Risk factors that affect the emergence of dysmenorrhea are reported as hormonal problems, prolonged exposure to stress, vitamin deficiencies, smoking, unhealthy eating habits and physical inactivity/sedentary lifestyle (12). Literature review points to studies which indicated that sedentary lifestyle is a risk factor for dysmenorrhea. (13, 14). Kaur et al. (2018) also concluded that physical activity is significantly effective in reducing pain and improving quality of life (15). Munuleh et al. (2018) stated that physical activity reduces the symptoms associated with dysmenorrhea (16).

Today, it is reported that physical activity is an effective approach that can be used non-pharmacologically for the prevention and treatment of dysmenorrhea (17). Physical activity has the effect of reducing renin levels and increasing estrogen and progesterone levels in women with dysmenorrhea. This change caused by physical activity reduces the physical symptoms related to dysmenorrhea and alleviates the complaints (18). According to studies, exercises that increase pelvic blood flow before menstruation delay the onset of prostaglandin accumulation in this region and facilitate the transfer of wastes from the uterus (19, 20). In addition, regular exercise plays an important role in reducing stress and increasing the level of endorphins (21). On the other hand, some studies in the literature did not detect any relationship between physical activity level and dysmenorrhea. In their study, Maruf et al. (2013) found no relationship between physical activity and dysmenorrhea, on the other hand, Latthe et al. (2006) reported an inverse relationship. In their study on 1,127 women, Barcikowska et al. (2020) found that women with sedentary lifestyles experienced dysmenorrhea, however the frequency of physical activity did not have an effect on

dysmenorrhea (22-24). Studies show that sedentary lifestyle is a risk factor for dysmenorrhea (13, 14).

In the studies carried out, the effect of physical activity in dysmenorrhea has not been clearly determined (25). However, the effects of physical activity limitation on health parameters in patients with dysmenorrhea during the pandemic are unknown. Accordingly, this study conducted to determine the effects of changing in physical activity levels during the pandemic period on pain and menstrual symptoms in patients with dysmenorrhea.

MATERIAL AND METHODS

Type of Research

The descriptive study used quantitative research methods.

Research Sample

The sample of the study consisted of individuals between the ages of 18-27 who were diagnosed with primary dysmenorrhea by an obstetrician and gynecologist. Inclusion criteria were as follows: not being pregnant before, not using drugs that cause dysmenorrhea, and agreeing to participate in the research. The exclusion criteria were as follows having undergone any surgical intervention related to dysmenorrhea, inability to stand without support, having cardiovascular disease, having irregular menstrual cycles, continuous drug use, cancer diagnosis, and refusal to participate in the study (26). Participants who did not fill out the questionnaire in full were not included in the study even though they met the inclusion criteria.

Measures

The study, carried out with 85 participants who agreed to participate in the study and met the inclusion criteria, was implemented in two phases when the data were collected: February 1-28, 2020, and November 1-30, 2020.

Participants’ socio-demographic characteristics were collected by face-to-face interview method.

Pain

Pain of the cases were assessed with Visual Analog Scale (VAS). VAS is a 0-10 cm (or 0-100 mm) horizontal line denoting the absence of pain at one end and the most severe pain at the other end (27). VAS has advantages since it is easy to understand and apply and it has been found reliable and valid in studies to measure the severity of menstrual pain (28).

Menstrual Symptoms

The cases’ menstrual symptoms were determined with Menstruation Symptom Questionnaire (MSQ). This scale was developed by Chesney and Tasto in 1975 to evaluate menstrual

pain and symptoms, and a Turkish validity and reliability study was conducted by Güvenç et al. in 2014. The five-point Likert type scale consists of 22 items and 3 sub-dimensions: “Negative effects/somatic complaints”, “Menstrual pain symptoms” and “Coping methods” (29, 30).

Physical Activity Levels

Participants’ physical activity levels were evaluated by International Physical Activity Questionnaire (IPAQ), developed by Craig et al. (31). The validity and reliability study of the questionnaire was conducted by Sağlam in Turkey in 2010 (32). This study utilized the self-report short IPAQ form “last 7 day recall” to evaluate the level of physical activity for the last seven days. In this study, individuals were divided into 3 groups as physically inactive (<600 MET-minutes/week), with insufficient physical activity (600-3000 MET-minutes/week) and with adequate physical activity level (>3000 MET-minutes/week) (33).

Statistical analysis

The data obtained in the study were analyzed with the Statistical Package for the Social Sciences (SPSS) Program version 25.0 (New York, IBM Corp) by writing the minimum, maximum, mean and standard deviation values for numerical values. The data were normally distributed according to the Kolmogorov-Smirnov test. Therefore the parametric tests were used for statistical analyses. The related-sample t-test was used to determine the difference between first and second assessment. A p value of <0.05 was considered statistically significant.

Ethics

Before starting the study, ethics committee approval was obtained from the Scientific Research and Publication Ethics Committee of Cappadocia University (Decision no: 2020.22-Application no: 29533901-204.07.07-11321). After the participants were informed about the content of the study, they read and signed the informed consent form stating that they voluntarily participated in the study. This study was conducted in accordance with the Declaration of Helsinki.

RESULTS

The cases mean age (min:19- max:27) was 20.75 ± 1.23 years old. The body mass index (BMI) of the individuals participating in this study was determined to be 21.50 ± 3.36 kg/m² (n=85) before the pandemic and 21.97 ± 3.15 kg/m² (n=85) during the pandemic. While the severity of dysmenorrhea of participants was 6.23 ± 1.78 (n=85) before the pandemic, it was 7.20 ± 1.63 (n=85) during the pandemic. While the individuals’ total MSQ score was 6.23 ± 1.78 (n=85) before the pandemic, it was 7.20 ± 1.63 (n=85) during the pandemic. It was found that the participants’ IPAQ score was 1274.67 ± 1232.26 (n=85) before the pandemic, it was 902.74 ± 892.33 (n=85) during the pandemic (Table 1). Based on physical activity levels,

individuals were divided into 3 groups as physically inactive, not active enough and active. It was observed that 60% (n=51) of the participants were in the “not active enough” group before the pandemic, and 55.3% (n=47) were in the “inactive” group during the pandemic (Table 1).

Table 1. Participants’ Age and BMI, VAS, MSQ, IPAQ Scores Before and During the Pandemic

		Minimum (n: 85)	Maksimum (n: 85)	Mean ± SD (n: 85)
Age		19	27	20.75 ± 1.23
BMI (kg/m ²)	1. assessment	16.9	29.4	21.50 ± 3.36
	2. assessment	16.7	32.8	21.97 ± 3.15
VAS	1. assessment	2	10	6.23 ± 1.78
	2. assessment	3	10	7.20 ± 1.63
MSQ	1. assessment	41	96	74.01 ± 13.09
	2. assessment	49	105	79.00 ± 13.88
IPAQ	1. assessment	66	8226	1274.67 ± 1232.26
	2. assessment	66	4590	902.74 ± 892.33
		%	n	
Physical Activity Levels	Inactive	1. assessment	31.8	27
			60	51
		8.2	7	
	2. assessment	55.3	47	
		42.4	36	
		2.3	2	

*BMI: Body mass index. VAS: Vizüel Analog Scale. MSQ: Menstruation Symptom Questionnaire. IPAQ-SF: International Physical Activity Questionnaire.

There was a statistically significant difference between the mean scores of cases’ VAS (t= -3.549, p=0.001) and IPAQ (t= 2.543, p=0.013) before and during the pandemic. There was no statistically significant difference between the mean MSQ (t= -0.781, p=0.437) and BMI (t= -.938, p=0.351) scores of cases before and during the pandemic (Table 2).

Table 2. Participants’ VAS, MSQ and IPAQ Scores Before and During the Pandemic

		n	Mean ± SD	t	p
VAS	1. assessment	85	6.23 ± 1.78	-3.549	0.001
	2. assessment	85	7.20 ± 1.63		
MSQ	1. assessment	85	74.01 ± 13.09	-.781	0.437
	2. assessment	85	79.00 ± 13.88		
IPAQ	1. assessment	85	1274.67 ± 1232.26	2.543	0.013
	2. assessment	85	902.74 ± 892.33		
BMI	1. assessment	85	21.50 ± 3.36	-.938	0.351
	2. assessment	85	21.97 ± 3.15		

VAS: Vizüel Analog Scale. MSQ: Menstruation Symptom Questionnaire. IPAQ: International Physical Activity Questionnaire. BMI: Body Mass Index.

DISCUSSION

In the study in which we investigated the effect of physical inactivity on dysmenorrhea, changes were detected in physical activity level, pain and menstrual symptom scale. The most important findings of this study was the decrease in the physical activity during pandemic period and increase in pain due to dysmenorrhea. In addition although the MSQ score and BMI score changed negatively during the pandemic, it did not show a statistically significant change. In their study, Gurel et al. (2021) examined the change in body mass during the lockdown period in the COVID-19 pandemic and reported that 44.6% (n=116) of the participants had an increase in body weight (34). In a different study conducted with women with dysmenorrhea, mean BMI was found to be 21.63 ± 2.98 kg/m² (n=23) (35).

It was determined that the difference between the 1st and 2nd BMI scores of the cases was approximately 0.50 kg/m². According to BMI, the results of the study show parallelism with the literature.

Takeda et al. (2021) reported that the VAS value increased when compared to the pre-pandemic measurements, and this increase was statistically significant (36). Buran and Öter (2022) reported that menstrual pain was more severe in those who had COVID-19 and this pain change was statistically significant (37). In this study, it was reported that the VAS values of the participants, which show the severity of dysmenorrhea, increased during the pandemic compared to the pre-pandemic period ($p=0.001$). According to VAS, the result of the study shows parallelism with the literature. The increase in the pain intensity of the participants may be due to the decrease in their physical activity levels.

It has also been reported that the increase in body mass index causes edema in the extremities, cramps, back pain and an increase in the severity of dysmenorrhea (38, 39). It can be thought that the decrease in physical activity levels and increase in BMI in the pandemic period may be among the factors provoking pain.

The increased number of MSQ scores reflected that negative situations in menstrual symptoms. In their study Issa et al. (2022) found pre-pandemic score is 70.04 ± 18.02 , pandemic score is 72.65 ± 21.72 (40). They examined the change MSQ score was significantly found after the pandemic compared to before it. According to the results of our study changing in MSQ scores from 74.01 ± 13.09 to 79.00 ± 13.88 were found. Although there was differences between the score of assessments, this changing scores was not statistically significant.

CONCLUSION

This study, which examined the effect of physical inactivity/sedentary lifestyles on dysmenorrhea, concluded that the pandemic conditions decreased participants' physical activity levels and increased their VAS and BMI values. Hence, increasing the level of physical activity can reduce the negative effect of dysmenorrhea, which seriously affects the quality of life. In order to minimize the negative impact of the pandemic on physical activity, quality time can be spent by following exercise programs from media communication tools during the time spent at home. Physical activities such as walking, running, climbing and ascending-descending stairs can be done in open areas.

LIMITATIONS

The limited age range of the sample and hence the assessment of individuals in similar age ranges along with the probability

that the MSQ score may change if the individuals are not in the same menstrual period are the limitations of this study.

Author Contribution: Study Design - DTA, AY; Design – DTA, AY, GB; Data Search - DTA, AY, GB, BB, OB, SV; Statistical Analysis – BB, OB; Literature Review - DTA, AY, GB; Data Interpretation - DTA, AY, GB; Critical Review - BB, OB; Manuscript Preparation- DTA,AY; Literature- DTA, AY, GB. All authors have read and agreed to the published version of the manuscript.

Conflict of interest: The authors declared no conflict of interest regarding this article.

Acknowledgements: None

REFERENCES

- Taskin L. Obstetrics and gynecology nursing. Turkey. Academician Bookstore. 2020; 611-614.
- Nguyen AM, Arbuckle R, Korver T, Chen F, Taylor B, Turnbull A, et al. Psychometric validation of the dysmenorrhea daily diary (DysDD): A patient-reported outcome for dysmenorrhea. *Qual Life Res.* 2017; 26(8): 2041-55. DOI: <https://doi.org/10.1007/s11136-017-1562-0>
- Yılmaz FA, Baser M. The effect of dysmenorrhea on school performance. *Gumushane University Journal of Health Sciences.* 2016; 5(3): 29-33.
- Sahin S, Kaplan S, Abay H, Akalin A, Demirhan I, Pinar G. Evaluation of the frequency of experiencing dysmenorrhea in university students and the affecting factors. *Journal of Ankara Health Sciences.* 2015; 4(1): 25-44.
- Al-Matouq S, Al-Mutairi H, Al-Mutairi Q, Abdulaziz F, Al-Basri D, Al-Enzi M, et al. A. Dysmenorrhea among high-school students and its associated factors in Kuwait. *BMC Pediatr.* 2019; 19(1): 1-12. DOI: <https://doi.org/10.1186/s12887-019-1442-6>
- Unsal A, Ayranci U, Tozun M, Arslan G, Calik E. Prevalence of dysmenorrhea and its effect on quality of life among a group of female university students. *Upsala Journal of Medical Sciences.* 2010; 115(2): 138-145. DOI: <https://doi.org/10.3109/03009730903457218>
- Armour M, Ee CC, Naidoo D, Ayati Z, Chalmers KJ, Steel KA, et al. Exercise for dysmenorrhoea. *Cochrane Database Syst Rev.* 2019; 20(9): 1-59. DOI: <https://doi.org/10.1002/14651858.CD004142.pub4>
- Fernández-Martínez E, Abreu-Sánchez A, Velarde-García JF, Iglesias-López MT, Pérez-Corrales J, Palacios-Ceña D. Living with restrictions. The perspective of nursing students with primary dysmenorrhea. *Int J Environ Res Public Health.* 2020; 17, 8527. DOI: <https://doi.org/10.3390/ijerph17228527>
- Cay B, Saka S. The effect of short-term aerobic exercise on dysmenorrhea in young adults. *Journal of Health Profession Research.* 2020; 2(3): 94-101.
- Shahjerdi S, Shaych Hosaini R. The effect of 8 weeks stretching exercise on primary dysmenorrhea in 15-17 aged high school student girl in Arak. *Journal of Shahrekord University Medical Sciences.* 2010; 11(4): 84-91.
- Potur Coskuner D, Komurcu N. Complementary therapies for dysmenorrhoea management. *Journal of Education and Research in Nursing.* 2013; 10(1): 8-13.
- Arafa AE, Khamis Y, Hassan HE, Saber NM, Abbas AM. Epidemiology of dysmenorrhea among workers in Upper Egypt: A cross sectional study. *Middle East Fertil Soc J.* 2018; 23(1): 44-47. DOI: <https://doi.org/10.1016/j.mefs.2017.07.002>
- Hailemeskel S, Demissie A, Assefa N. Primary dysmenorrhea magnitude, associated risk factors, and its effect on academic performance: evidence from female university students in Ethiopia. *Int J Women's Health.* 2016; 8, 489-496. DOI: <https://doi.org/10.2147/IJWH.S112768>
- Iacovides S, Avidona I, Baker FC. What we know about primary dysmenorrhea today: a critical review. *Hum Reprod Update.* 2015; 21, 762–778. DOI: <https://doi.org/10.1093/hump/dmv039>
- Kaur M, Bains BS, Ramachandran B, Rao BK. Role of combined exercise on primary dysmenorrhoea pain among girls: a quasi-experiment. *Journal of Physiotherapy Research.* 2018; 8(1): 88-93. DOI: <https://doi.org/10.17267/2238-2704rpf.v8i1.1783>
- Muluneh AA, Nigussie TS, Gebreslasie KZ, Anteneh KT, Kassa ZY. Prevalence and associated factors of dysmenorrhea among secondary and preparatory school students in Debreberk town, North-West Ethiopia. *BMC Womens Health.* 2018; 18, 57. DOI: <https://doi.org/10.1186/s12905-018-0552-x>
- Nasri M, Barati A, Ramezani A. Comparison of aerobic training and pelvic floor muscle exercise on primary dysmenorrhea in adolescent girls. *Journal of Clinical Nursing and Midwifery.* 2016; 5, 53-61.
- Ortiz MI, Cortes-Marquez SK, RomeroQuezada LC, Murguía-Canovas G, JaramilloDiaz AP. Effect of a physiotherapy program in women with primary dysmenorrhea. *Eur J Obstet Gynecol Reprod Biol.* 2015; 194, 24-29. DOI: <https://doi.org/10.1016/j.ejogrb.2015.08.008>
- Dehnavi, Z. M., Jafarnejad, F., Kamali, Z. The Effect of aerobic exercise on primary dysmenorrhea: A clinical trial study. *J Educ Health Promot.* 2018; 7, 3.
- Jaleel G, Shaphe MA, Khan AR, Malhotra D, Khan H, Parveen S, et al. Effect of Exercises on Central and Endocrine System for Pain Modulation in Primary Dysmenorrhea. *J Lifestyle Med.* 2022. Jan 31;12(1):15-25.
- Heidarijanpour A, Zamiri Dalir F, Shouride Yazdi M. The effects of eight week aerobic exercise on menstrual cycle disorders and hormones levels of FSH and LH. *Journal of Sabzevar University of Medical Sciences.* 2016; 23(2): 336–343.
- Maruf FA, Ezenwafor NV, Moroofo SO, Adeniyi AF, Okoye EC. Physical activity level and adiposity: are they associated with primary dysmenorrhea in school adolescents?. *Afr J Reprod Health.* 2013; 17(4):167-174.
- Latthe P, Magjini L, Gray R, Hills R, Khan K. Factors predisposing women to chronic pelvic pain: systematic review. *Br Med J.* 2006; 332, 749-755.
- Barcikowska Z, Wójcik-Bilkiewicz K, Sobierajska-Rek A, Grzybowska MA, Piotr Wąp P, Zorena K. Dysmenorrhea and associated factors among polish women: a cross-sectional study. *Pain Res Manag.* 2020; 1-10. DOI: <https://doi.org/10.1155/2020/6161536>
- Fatai A, Maruf, Nonyelum V, Ezenwafor, Suleman O, Moroofo, Ade F, Adeniyi and Emmanuel C. Okoye. Physical activity level and adiposity: are they associated with primary dysmenorrhea in school adolescents?. *African journal of reproductive health.* 17. 167-74.
- Ryan SA. The treatment of dysmenorrhoea. *pediatric clinics of north America.* *Pediatr Clin North Am.* 2017; 64(2): 331-342. DOI: <https://doi.org/10.1016/j.pcl.2016.11.004>
- Wong C, Lai K, Tse H. Effects of SP6 acupressure on pain and menstrual distress in young women with

- dysmenorrhea. *Complimen Ther Clin Pract*. 2010; 16(2): 64-69.
28. Mirbagher-Ajorpaz N, Adib-Hajbaghery M, Mosaebi F. The effects of acupuncture on primary dysmenorrhea: a randomized controlled trial. *Complimen Ther Clin Pract* 2011; 17(1): 33-36. DOI: <https://doi.org/10.1016/j.ctcp.2010.06.055>
29. Chesney MA, Tasto DL. The development of the menstrual symptom questionnaire. *Behav Res Ther*. 1975; 13(4): 237-244. DOI: [https://doi.org/10.1016/0005-7967\(75\)90028-5](https://doi.org/10.1016/0005-7967(75)90028-5)
30. Guvenc G, Seven M, Akyuz A. Adaptation of the menstrual symptom questionnaire into Turkish. *TAF Preventive Medicine Bulletin*. 2014; 13(5): 367-374. DOI: <https://doi.org/10.5455/pmb.1-1378840527>
31. Craig CL, Marshall AL, Sjoström M, et al. International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc*. 2003; 35(8):1381-1395.
32. Sağlam M, Arikan H, Savci S, Inal-Ince D, Bosnak-Guclu M, Karabulut E, Tokgozoglu L. International physical activity questionnaire: reliability and validity of the Turkish version. *Percept Mot Skills*. 2010; 111(1):278-84. DOI: <https://doi.org/10.2466/06.08.PMS.111.4.278-284>
33. Savci S, Ozturk M, Arikan H, Inal Ince D, Tokgozoglu L. Physical activity levels of university students. *Archives of the Turkish Society of Cardiology*. 2006; 34(3):166-172.
34. Gurel S, Ok MA. Determination of the effect of the covid-19 outbreak process on the nutrition habits, physical activity and body weights of health education students covid-19. *Journal of Baskent University of Faculty of Health*. 2021; 6, 1-15.
35. Karakus A, Ozer Kaya D, Toprak Celenay S. A comparison of spinal posture and mobility in women with and without primary dysmenorrhea. *JETR*. 2021; 32(1): 20-27.
36. Takeda T, Kai S, Yoshimi K. Association between Premenstrual Symptoms and Posttraumatic Stress Symptoms by COVID-19: A Cross-Sectional Study with Japanese High School Students. *TJEM*. 2021; 255: 71-77.
37. Buran G, Emine Öter G. Impact of The Awareness And Fear of COVID-19 On Menstrual Symptoms In Women: A Cross-Sectional Study. *Health Care Women Int*. 2022; 243(4):413-27.
38. Koyucu RG, Olmez R. Determining the premenstrual syndrome levels in students of faculty of health sciences during the Covid-19. *Acıbadem University Journal of Health Sciences*. 2021; 2(2): 496-501. DOI: <https://doi.org/10.31067/acusaglik.852093>
39. Ju H, Jones M, Mishra GD. A u-shaped relationship between body mass index and dysmenorrhea: a longitudinal study. *PLoS one*. 2015; 10(7): 1-12. DOI: <https://doi.org/10.1371/journal.pone.0134187>
40. Issa R, Kharaba Z, Azzi V, Obeid S, Sawma T, Said A, et al. Menstrual Symptoms Variation Among Lebanese Women Before And After The COVID-19 Pandemic. *PharmPract*. 2022; 20(3): 2699.

41. [enp](#)

42. [enp](#)

43. [enp](#)