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The Evaluation of Physical Activity Levels and Sleep Quality of High School and University Students During the COVID-19 Pandemic

COVID-19 Pandemisinde Lise ve Üniversite Öğrencilerinin Fiziksel Aktivite Düzeyleri ve Uyku Kalitelerinin Değerlendirilmesi

Merve Koca Kosova, Sercin Kosova

Dokuz Eylül University Necat Hepkon Faculty of Sport Sciences, Department of Physical Education and Sports Teaching, İzmir, Turkey

Abstract

Objective: There are major changes in the lifestyles of students with the limitations of the Coronavirus disease-2019 pandemic. This study aimed to determine the physical activity status and sleep quality of high school and university students during the pandemic and to compare the sleep quality findings according to their physical activity status.

Materials and Methods: The data were collected electronically. The short form of the International Physical Activity Questionnaire (IPAQ short form) and the Pittsburgh sleep quality index (PSQI) scale were used. The Kruskal-Wallis test was used for the determination of the difference between the groups, which were separated according to IPAQ scores. The correlation between the metabolic equivalents (METs) obtained from the IPAQ score and PSQI score was evaluated using Spearman's correlation analysis

Results: The rate of students who were found inactive was 27.1%, and the rate of those who were found minimally active was 38.1%. In addition, 66.5% of the students had poor sleep quality. There was no significant difference between the PSQI scores and sleep components in the through groups separated according to IPAQ scores. There was no correlation between METs (min/week) and PSQI scores.

Conclusion: These findings show that students may be negatively affected both physically and psychologically. After the pandemic, this lifestyle may become permanent and health problems may arise. Students should be made aware of this subject and accessible solution proposals should be created. Finally, more research is needed to understand the possible interaction between physical activity and sleep quality.

Keywords: Physical activity, sleep quality, young adults, COVID-19

Öz

Amaç: Koronavirüs hastalığı-2019 pandemisinin sınırlamaları ile öğrencilerin yaşam tarzlarında büyük değişiklikler gerçekleşmiştir. Bu çalışmada, lise ve üniversite öğrencilerinin pandemi dönemindeki fiziksel aktivite durumları ve uyku kalitelerinin belirlenmesi ve uyku kalitesi bulgularının fiziksel aktivite durumlarına göre karşılaştırılması amaçlanmıştır.

Gereç ve Yöntem: Veriler elektronik olarak toplandı. Uluslararası Fiziksel Aktivite Anketi'nin (UFAA) kısa formu ve Pittsburgh uyku kalitesi indeksi (PUKİ) ölçeği kullanıldı. UFAA skoruna göre ayrılan gruplar arasındaki farkın belirlenmesinde Kruskal-Walllis testi kullanıldı. UFAA skorundan elde edilen metabolik eşdeğer (MET) ile PUKİ skoru arasındaki korelasyon Spearman korelasyon analizi kullanılarak değerlendirildi.

Bulgular: İnaktif olan öğrencilerin oranı %27,1 iken, minimal aktif olanların oranı %38,1 idi. Ayrıca öğrencilerin %66,5'inin uyku kalitesi kötüydü. UFAA puanına göre ayrılan üç grupta PUKİ toplam puanı ile uyku bileşenleri arasında anlamlı fark yoktu. MET (dk/hafta) ile PUKİ skoru arasında korelasyon yoktu.

Sonuç: Bu bulguların, öğrencilerin hem fiziksel hem de psikolojik olarak olumsuz etkilenmelerinin sonucu olduğu düşünülmektedir. Pandemi sonrasında bu yaşam tarzı kalıcı hale gelebilir ve sağlık sorunları ortaya çıkabilir. Bu nedenle,öğrenciler bu konuda bilinçlendirilmeli ve ulaşılabilir çözüm önerileri oluşturulmalıdır. Bununla birlikte, fiziksel aktivite ve uyku kalitesi arasındaki olası etkileşimi anlamak için daha fazla araştırmaya ihtiyaç vardır.

Anahtar Kelimeler: Fiziksel aktivite, uyku kalitesi, genç yetişkinler, COVID-19

Address for Correspondence/Yazışma Adresi: Merve Koca Kosova PhD, Dokuz Eylül University Necat Hepkon Faculty of Sport Sciences, Department of Physical Education and Sports Teaching, İzmir, Turkey

Phone: +90 554 807 79 40 **E-mail:** merve.koca@deu.edu.tr **ORCID-ID:** orcid.org/0000-0003-0454-2790

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Introduction

Physical activity is a very comprehensive concept that includes all movements, from regular forms of exercise to simple activities in daily life (1). Regardless of the volume of the activity, all movements that cause energy expenditure can be considered within the concept of physical activity (2). The World Health Organization (WHO) recommends that it is better to do a little physical activity than to do nothing, and at the same time, it offers activity recommendations for each age group (3).

Sleep is one of the most important factors in the functioning of the immune system and protection against diseases (4). Sleep quality, as a concept that affects the quality of life as a whole, has become one of the issues that have been studied meticulously in recent years. Baldursdottir et al. (5) investigated the effect of walking on adolescents' subjective sleep quality and they found significant improvements. It has been shown that home exercises performed in older individuals also improve sleep quality (6). However, literature findings are not completely compatible. For example, in a cross-sectional study, the authors find that physical activity was not associated with sleep quality in young adults (7). In another study, no relationship was found between vigorous physical activity and sleep quality in university students (8). Different findings in the literature indicate the need for further research on the subject. Accordingly, it will be possible to offer clearer recommendations to target groups on issues such as protecting health and increasing the quality of life.

Coronavirus disease-2019 (COVID-19) is a disease that shows high morbidity and mortality and affects the whole world (9). After the extreme cases and deaths in many countries of the world, the WHO declared a pandemic on March 11th, 2020, at which time the first case in Turkey appeared. Thus, in many countries, social isolation and quarantine began to affect the lives of millions of people. Education systems were organized to continue either online or through other routes. As the United Nations Educational, Scientific and Cultural Organization reported, the closure of schools and universities affected nearly 500 million students. This situation caused a decrease in the physical activity levels of the students (10,11). At the same time, all these conditions can cause changes in eating habits and an increase in obesity rates (12). Martínez-de-Quel et al. (13) found significant negative effects on physical activity levels, sleep quality, and well-being levels of participants who were previously physically active due to the pandemic. It is estimated that the lives of high school and university students have changed drastically because the coronavirus has affected the whole world so much.

The aim of this study was primarily to investigate the physical activity status and sleep quality of students during the COVID-19 pandemic and to compare the sleep quality findings according to their physical activity status.

Materials and Methods

Participants and study design

Two hundred thirty-six (female 52.7%, male 46.8%) students who were voluntarily continuing their education in high school and university were included in this study. The data of the study were collected electronically using Google docs/forms from April 5th to May 15th, 2021. Diagnoses of mental disorders and alcohol and substance abuse were determined as exclusion criteria for the study. The short form of the ınternational physical activity questionnaire (IPAQ) was used to determine the physical activity status of the participants, and the Pittsburgh sleep quality index (PSQI) scale was used to determine the sleep quality status. Ethical statements were obtained electronically from the participants before they started answering the questions.

Instruments

IPAQ: The short form of IPAQ, which was tested for validity and reliability (14) for individuals aged 15-69 years in Turkey, was used. IPAQ evaluates many different activities, such as leisure-time physical activities, home and garden activities, work-related physical activities, and transportation-related physical activities. Metabolic equivalents (METs) were calculated in minutes/week to determine the physical activity levels of the participants in line with the findings obtained from IPAQ. As a result of the calculation, those with physical activity levels <600 MET min/week were determined as inactive, those with >600-3.000 MET min/week were determined as the minimum active group, and those with >3.000 MET min/week were determined as the very active group (15,16).

PSQI: The PSQI is a scale used to evaluate sleep quality. It provides to determine sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleeping medications, and daytime dysfunction with questions asked under seven main headings. The questions are scored between 0 and 3. High scores reflect poor sleep quality. Each component is evaluated both within itself and combined with other components to provide a total assessment of sleep quality. A total score of more than five is considered as poor sleep quality (17,18).

Statistical Analysis

The values of the current study were presented as mean ± standard deviation. Shapiro-Wilk test was used for the normality and data was not normally distributed ($p<0.05$). The Kruskal-Wallis test was used for the determination of the difference between the groups. If there was a difference, Tamhane posthoc analysis was performed to determine from which group it originated. The correlation between the MET score and PSQI score was evaluated using Spearman's correlation analysis. For statistical evaluation the IBM SPSS Statistics for Windows Ver. 20 was used and p-value of <0.05 was preffered.

Ethical statement

This study was conducted with the approval of the Dokuz Eylül University Non-Interventional Research Ethics Committee (decision no: 2021/11-39).

Results

According to the IPAQ scores, 27.1% of the entire group were found to be inactive, 38.1% were minimally active, and 34.7%

were very active. According to the PSQI score, 66.5% of the entire group had poor sleep quality. Descriptive analysis of all participants is shown in Table 1.

As expected, a significant difference was found between the MET values in the three groups, which were separated according to IPAQ scores ($p<0.001$). However, no significant difference was found between PSQI scores and sleep components ($p>0.05$). These values are shown in Table 2.

There was a significant difference in MET values between the inactive and minimally active groups (mean difference: -1186.06, $p<0.001$), between the inactive and very active groups (mean difference: -5446.04, $p<0.001$), and between the minimally active and very active groups (mean difference: -4259.98, $p<0.001$) when comparing groups according to Tamhane post-hoc analysis.

When PSQI and sleep components in both sexes were examined separately according to physical activity levels, there were no significant differences between the groups ($p>0.05$). Finally, when the entire group was evaluated together, there was no correlation between METs (min/week) obtained from the IPAQ scores and PSQI scores ($r=-0.080$, $p=0.220$).

Discussion

In this study, the physical activity status and sleep quality of high school and university students during the pandemic period were examined. It was predicted that physical activity levels would decrease and sleep quality would deteriorate in student population who studying online. Therefore the existence of a possible relationship between these two parameters was investigated. In addition, sleep components were compared in three groups, which were separated according to their physical activity status. The most striking findings of the study were that 27.1% of the students were inactive and 66.5% had poor sleep quality. This situation can have important consequences such as negatively affecting adolescents and young adults physically. In addition, the danger of this lifestyle becoming permanent is a problem that needs to be addressed.

It has been shown in the literature that being physically active supports a healthy life and is effective in preventing many chronic diseases (19). It is known that physical activity is also recommended against inactivity, another major problem that the world is grappling with, during the COVID-19 pandemic (20). Despite all these findings and recommendations, it is alarming that a significant part of the young population is found to be physically inactive, especially after the pandemic started, both in this study and in different studies in the literature (21,22). Martínez-de-Quel et al. (13) reported that lockdown did not significantly affect physically inactive individuals. This means that these people lived an inactive life as if they were living in lockdown before the pandemic. To prevent unhealthy generations, the solution to this problem should not be postponed and attempts to change this situation should be implemented quickly. Giving education to young individuals about the benefits of physical activity and increasing their awareness on this subject pushes them to be more physically active (23). In addition, young individuals should embrace the concept of physical literacy, which includes many factors (24), and be encouraged to spend their entire lives physically literate. Sleep has an important place for basic functions in human life and sleep-related problems can lead to deterioration of

Table 1. Descriptive analysis of the participants

		Mean ± SD					
Group	**n**	**Age (years)**	**Height (cm)**	**Mass (kg)**	**BMI**	**METs**	**PSQI**
All	236	20.77±5.00	172.5±0.10	65.82±14.05	21.95±3.27	2819.95±3126.44	7.19±3.21
W	125	20.10±4.03	166±0.08	56.91±8.24	20.70±2.61	2384.22±2800.16	7.40±3.50
M	111	21.53±5.82	180.6±0.07	75.86±12.38	23.36±3.36	3310.64±3403.61	6.97±2.85

BMI: Body mass index, MET: Metabolic equivalents, PSQI: Pittsburgh sleep quality index, All: All participants, W: Women, M: Men

Table 2. Comparisons in groups separated by physical activity levels

	Inactive group n=64	**Minimal active group n=90**	**Very active group n=82**	**Kruskal-Wallis**
	Mean ± SD	**Mean ± SD**	**Mean ± SD**	**p**
MET	475.37±531.92	1661.44±762.45	5921.42±3453.57	**0.001***
PSQI	7.19±3.35	7.44±3.14	6.94±3.21	0.480
Subjective sleep quality	1.36±0.84	1.32±0.72	1.24±0.60	0.812
Sleep latency	2.25±1.80	2.43±1.70	2.29±1.56	0.801
Sleep duration	0.55±0.94	0.58±0.91	0.54±0.80	0.816
Habitual sleep efficency	0.45±0.87	0.58±0.92	0.40±0.81	0.351
Sleep disturbance	1.30±0.63	1.30±0.59	1.28±0.55	0.980
Use of sleeping medication	0.14±0.64	0.06±0.31	0.01±0.11	0.440
Daytime dysfunction	1.14±0.97	1.78±0.99	1.17±0.94	0.972

*p≤0.001, MET: Metabolic equivalents, PSQI: Pittsburgh sleep quality index, SD: Standard deviation

health (25). During the COVID-19 pandemic, it has been reported that sleep habits have changed in young individuals (26), just like physical activity. Considering these changes, this study was planned to contribute to the physical activity-sleep relationship, which is still being investigated. Based on the view that there is a bidirectional relationship between sleep quality and physical activity (27), many studies have been performed. In a study conducted with university students, it was found that sleep quality was associated with physical activity levels (28). Thus, the view that physical activity level can be improved by increasing sleep quality was supported. In another study, physical activity and screen time were associated with sleep quality (29). Contrary to this finding, Kakinami et al. (7) reported that physical activity was not associated with sleep quality in young adults. In addition to the contradictory findings in the literature, this study also reports no correlation between physical activity and sleep quality. Similar to our study Yaran et al. (30) reported that there was no significant difference in PSQI levels of university students who did and did not do regular sports activities. Considering the literature findings published specifically for pandemic restrictions, Ingram et al. (31) found a positive correlation between sleep quality and physical activity alterations. In another study, being physically active was found statistically associated with higher sleep quality [Sañudo et al. (32)]. Differences between studies may be due to many reasons. The climate in the geography where the study was conducted, psychological problems, the age of the participants, and their nutritional status may be some of these reasons. Changes in sleep during adolescence (33) may also prevent consistent findings for these age groups. More studies are needed to better understand the possible causes of these differences and the interaction between physical activity and sleep quality.

Conclusion

To conclude, although no statistically positive or negative correlation was found between the scale score measuring physical activity and the scale score measuring sleep quality, the importance of both concepts for raising physically and mentally healthy generations is obvious. For this reason, students, families and educators should be informed about the importance of physical activity and sleep quality through educational institutions and/or media communication. In addition, daily programs can be created for students during and after the pandemic, where they can be physically active and provide a regular sleep environment.

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Ethics

Ethics Committee Approval: This study was conducted with the approval of the Dokuz Eylül University Non-Interventional Research Ethics Committee (decision no: 2021/11-39).

Informed Consent: Ethical statements were obtained electronically from the participants before they started answering the questions.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: M.K.K., S.K., Design: M.K.K., S.K., Data Collection or Processing: M.K.K., Analysis or Interpretation: M.K.K., S.K., Literature Search: M.K.K., Writing: M.K.K., S.K.

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