

# Physical Activity, Anxiety, and Seizure Frequency in Epilepsy: The Results of the First 3 Months of the Coronavirus Disease 2019 Pandemic

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## Abstract

**Objectives:** The coronavirus disease 2019 (COVID-19) pandemic is an extraordinary experience around the world; however, its effect on physical activity, anxiety, and seizure frequency remains unknown among epilepsy patients in the time of the national lockdown. We aimed to investigate whether the physical activity, anxiety, and seizure frequency were affected during the national lockdown of the first 3 months in patients with epilepsy.

**Methods:** Forty-seven epilepsy patients participated in this study. The International Physical Activity Questionnaire-Short Form (IPAQ-SF; metabolic equivalent [MET]-min/week) was used to measure physical activity level. Patients' anxiety was assessed with the Generalized Anxiety Disorder 7-item (GAD-7; score). The patients answered the IPAQ-SF and GAD-7 questions through telephone interviews.

**Results:** The total IPAQ-SF (MET-min/week) scores of patients decreased during the national lockdown compared to pre-lockdown period, while the daily sitting time (min/day) increased ( $p < 0.001$ ). According to the GAD-7 scores, 18 (38.3%) patients had minimal, and only 4 (8.5%) patients had severe anxiety during the lockdown. No changes in seizure frequency were reported by 44 (93.6%) patients.

**Conclusion:** The presence of physical inactivity and anxiety due to the national lockdown in the time of COVID-19 pandemic can have a detrimental effect on the well-being of epilepsy patients. Patients should participate to the home-based physical activity programs to enhance both their mental and physical health.

**Keywords:** Anxiety; coronavirus disease 2019; epilepsy; lockdown; physical activity; seizures.

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## Introduction

The coronavirus disease 2019 (COVID-19) pandemic is an extraordinary experience that threatens public health worldwide.<sup>[1]</sup> The World Health Organization (WHO) and National Health Advisory Services recommended to practice self-isolation and quarantine to prevent the spread of

infection. Curfew and lockdown measures in Turkey were imposed for fighting the pandemic. The travel restriction, the closure of the public rest and entertainment venues, working home-office, flexible working time, and distance education at schools and universities have been introduced during the first wave of the pandemic. At the time of planning this article, a general curfew was imposed on everyone at weekends (The Turkish Ministry of Health, 2020).

The physical inactivity was described as a "pandemic" in 2012 Lancet Physical Activity Series paper. It represents 6% of global deaths worldwide.<sup>[2,3]</sup> Insufficient physical activity deteriorates the mental health and quality of life. The WHO has targeted 10% relative reduction in physical inactivity by 2025. As long as the inactivity condition continues, it is not possible to reach this global target.<sup>[4]</sup>



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## Epilepside Fiziksel Aktivite, Anksiyete ve Nöbet Sıklığı: Koronavirüs Hastalığı 2019 Pandemisinin İlk Üç Aylık Sonuçları

### Öz

**Amaç:** Koronavirüs hastalığı 2019 (COVID-19) pandemisi dünya genelinde sıra dışı bir deneyimdir, fakat ulusal çapta uygulanan sokağa çıkma yasağının epilepsili hastalarda fiziksel aktivite, anksiyete ve nöbet sıklığı üzerine etkisi bilinmemektedir. Biz, ulusal düzeyde uygulanan sokağa çıkma yasağının ilk üç aylık döneminde epilepsili hastaların fiziksel aktivite, anksiyete ve nöbet sıklığının etkilenip etkilenmediğini araştırmayı amaçladık.

**Gereç ve Yöntem:** Çalışmaya 47 epilepsi hastası katıldı. Fiziksel aktivite düzeyini değerlendirmek için Uluslararası Fiziksel Aktivite Anketi-Kısa Form (UFAA; metabolik eşdeğer [MET]-dk/hafta) kullanıldı. Hastaların anksiyete düzeyi Yaygın Anksiyete Bozukluğu 7 (YAB-7; skor) ile değerlendirildi. Hastalar, UFAA ve YAB-7 sorularını telefon görüşmesiyle cevapladı.

**Bulgular:** Hastaların toplam UFAA (MET-dk/hafta) skorları ulusal çapta uygulanan sokağa çıkma yasağı sırasında azalırken, oturma süreleri (dk/gün) arttı ( $p < 0.001$ ). YAB-7 skorlarına göre, 18 (%38.3) hasta minimal anksiyete düzeyine sahipti ve sadece 4 (%8.5) hasta ciddi anksiyete düzeyindeydi. Nöbet sıklığında değişim olmadığı 44 (%93.6) hasta tarafından raporlandı.

**Sonuç:** COVID-19 pandemisinde uygulanan ulusal çapta sokağa çıkma yasağı nedeniyle ortaya çıkan fiziksel inaktivite ve anksiyete, epilepsili hastaların iyilik hali üzerine yıkıcı etkiye sahip olabilir. Hastaların mental ve fiziksel sağlığını iyileştirmek için ev tabanlı fiziksel aktivite programlarına katılmaları teşvik edilmelidir.

**Anahtar sözcükler:** Anksiyete; epilepsi; fiziksel aktivite; koronavirüs hastalığı 2019; nöbetler; sokağa çıkma yasağı.

Based on the above information, the world faces a pandemic of both the COVID-19 and physical inactivity.<sup>[3,5]</sup> From the previous studies, we know that physical activity level of epilepsy patients was lower compared with controls.<sup>[6]</sup> Furthermore, there is currently no evidence demonstrating the effects of the COVID-19 lockdown in Turkey on the physical activity, anxiety, and seizure frequency of patients. We hypothesized that the physical activity of epilepsy patients will be reduced and anxiety will be developed. In this study, we aimed to investigate the effect of the COVID-19 lockdown of the first 3 months on patients with epilepsy in terms of physical activity, anxiety, and change in seizure frequency.

### Materials and Methods

**Design and Participants**– This cross-sectional study was approved by the Republic of Turkey Ministry of Health and Noninvasive Research Ethics Board of Dokuz Eylül University (Protocol number: 5493-GOA; approval number: 2020/13-42). The study was conducted in accordance with the Declaration of Helsinki.

Forty-seven of 62 epilepsy patients (response rate 75.80%), who admitted to the Department of Neurology at Dokuz Eylül University for routine follow-up in the past 3 months before the COVID-19 pandemic, were recruited in this study. Eligibility for participation was as follows: (1) Adults aged 18–65 years and (2) epilepsy diagnosis, according to the International League Against Epilepsy criteria. Epilepsy patients with physical and mental disability, other neurological, cardiovascular, and musculoskeletal disorders that

could restrict participation in physical activity were excluded from the study.

**Measures**– To assess physical activity level and anxiety severity, the International Physical Activity Questionnaire-Short Form (IPAQ-SF)<sup>[7]</sup> and Generalized Anxiety Disorder scale 7-item (GAD-7)<sup>[8]</sup> were, respectively, used. Data were collected through phone interview.

The physical activity level of participants was separately queried both pre-lockdown and during the COVID-19 pandemic lockdown in Turkey, whereas their anxiety level was only queried during the national lockdown. The patients were asked to reply all questions considering the time from March 11, 2020 (declaration date of the first COVID-19 case in Turkey and WHO's identification as a pandemic) to June 1, 2020, (the last day of lockdown in Turkey) on June 15–20, 2020.

The IPAQ-SF is a self-reported instrument for monitoring of physical activity level among 18–65 ages adults.<sup>[7]</sup> It records on time spent in vigorous and moderate intensity activity, walking and sitting over the previous 7 days. The participants were instructed to recall the number of days and duration for conducting each item over typical 7 days both before and during the national COVID-19 lockdown. To estimate physical activity level, a metabolic equivalent (MET) value of each item according to the IPAQ-SF scoring protocol was applied: For vigorous-intensity activity, 8 MET; for moderate-intensity activity, 4 MET; and for walking, 3.3 MET. The activity scores (MET-min/week) of each item were separately calculated by multiplying the corresponding

MET value, the reported number of day, and duration. The total physical activity score (MET-min/week) was obtained by summing of all activity scores. The amount of sitting time expressed as minutes was not included in total physical activity score (www.ipaq.ki.se). The Turkish version of the IPAQ-SF was translated by Saglam et al.<sup>[9]</sup>

The GAD-7 scale is a self-administered questionnaire to assess the generalized anxiety symptoms based on the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV). Each item is scored from 0 (not at all) to 3 (nearly every day). Total scores range from 0 to 21, with higher scores indicating more severe anxiety. The score may be interpreted as 0–4=minimal, 5–9=mild, 10–14=moderate, and 15–21=severe anxiety level.<sup>[8]</sup> It has been translated and validated in patients with Turkish population, with a cutoff value of 8 for the GAD-7.<sup>[10]</sup>

**Statistical Analysis**– Statistical analyses were performed using IBM SPSS, version 24.0. Data normality was tested with the “Shapiro–Wilk test.” The descriptive statistics of variables were presented as “median (interquartile range).” The “Wilcoxon signed-rank test” was used to investigate the difference in physical activity outcomes between before

**Table 1.** Characteristics of the patients with epilepsy (n=47)

	Median (IQR)
Age (years)	34.00 (27.00–46.00)
Sex, n (%)	
Female	26 (55.3)
Male	21 (44.7)
Seizure frequency*, n (%)	
Daily	2 (4.3)
Less than daily but at least once a week	3 (6.4)
Less than weekly but at least once a month	11 (23.4)
Less than monthly but at least once a year	18 (38.3)
Less than once a year	13 (27.7)
Seizure type, n (%)	
Focal	28 (59.6)
Generalized	19 (40.4)
Antiepileptic drugs, n (%)	
Monotherapy	25 (53.2)
Polytherapy	22 (46.8)

\*Patients were classified according to the number of seizures which had experienced during previous 1 year, IQR: Interquartile range.

and during the national lockdown. The level of significance was set at  $p < 0.05$ .

## Results

In total, 62 epilepsy patients were enrolled. Among them, eight patients could not be reached through phone call; seven patients declined to participate. A total of 47 patients with epilepsy took part in this study, with a response rate of 75.80%.

**Table 2.** The COVID-19 lockdown conditions related questions (n=47)

COVID-19-related questions	n (%)
Afraid of infecting by COVID-19 (yes answer)	23 (48.9)
Working status during the COVID-19 pandemic	
Working like pre-pandemic	3 (6.4)
Working from home	2 (4.3)
Flexible working time	20 (42.6)
Unemployed	5 (10.6)
Retired	3 (6.4)
Student	5 (10.6)
Homemaker	9 (19.1)
Reported health changes	n (%)
Changes in seizure frequency during the lockdown	
No change	44 (93.6)
Decreased	3 (6.4)
Believe that COVID-19 pandemic has exacerbated your seizures (yes answer)	6 (12.8)
Reported exercise habit during the lockdown	
Same as pre-lockdown*	34 (72.3)
Less than pre-lockdown	5 (10.6)
More than pre-lockdown	8 (17.0)
Anxiety level during the lockdown	n (%)
GAD-7 (based on cutoff value of 8 for the GAD-7)	
Representing anxiety symptoms	16 (34.0)
No anxiety symptoms	31 (66.0)
GAD-7 (score range, 0–21)	
Minimal (0–4)	18 (38.3)
Mild (5–9)	15 (31.9)
Moderate (10–14)	10 (21.3)
Severe (15–21)	4 (8.5)

\*Patients reported “I have no exercise habit.” GAD-7: Generalized Anxiety Disorder 7-item.

**Table 3.** Physical activity outcomes before and during the national lockdown (n=47)

	Pre-lockdown, median (IQR)	During the lockdown, median (IQR)	Z	p-value
IPAQ-SF (MET-min/week)				
Vigorous	0.00 (0.00–0.00)	0.00 (0.00–0.00)	–0.527	0.598
Moderate	0.00 (0.00–0.00)	0.00 (0.00–0.00)	–0.119	0.906
Walking	693.00 (445.50–1155.00)	247.50 (33.00–462.00)	–5.423	<0.001*
Sitting time, min/day	420.00 (300.00–480.00)	570.00 (420.00–660.00)	–4.441	<0.001*
Total physical activity	825.00 (445.50–1386.00)	297.00 (66.00–594.00)	–4.517	<0.001*

\*p<0.05. IQR: Interquartile range; IPAQ-SF: International Physical Activity Questionnaire-Short Form. Statistical significance was determined by Wilcoxon signed-rank test.

The clinical features, COVID-19-related questions, and reported health changes of patients are shown in Tables 1 and 2. There were no patients diagnosed with the COVID-19 infection. No changes in seizure frequency during the national lockdown conditions were reported by 44 (93.6%) patients (Table 2).

Based on cutoff point of the GAD-7 scale, 16 patients (34.0%) had anxiety during the lockdown. Four (8.5%) patients had severe anxiety (Table 2).

The physical activity outcomes before and during the national lockdown period are represented in Table 3. The total IPAQ-SF (MET-min/week) score and walking (3.3 MET-min/week) activity of epilepsy patients declined during the lockdown ( $p<0.001$ ), there were no differences in the vigorous-intensity (8 MET-min/week) and moderate-intensity (4 MET-min/week) activities between pre-lockdown and during the lockdown ( $p>0.05$ ). The daily sitting time (min/day) of the patients increased during the lockdown ( $p<0.001$ ).

## Discussion

To the best of our knowledge, this is the first study that investigates the effect of the national COVID-19 lockdown of the first 3 months on epilepsy patients in terms of physical activity, anxiety, and seizure frequency. Our results revealed a statistically significant reduction in physical activity level during the national lockdown. The patient's walking duration decreased, whereas the sitting duration increased. The COVID-19 lockdown period caused to develop anxiety in patients. Seizure frequency remained unchanged in the majority of patients.

As in our study, the social isolation and confinement at home created by the COVID-19 pandemic led to reduce in habitual and recreational physical activities.<sup>[11]</sup> The WHO suggested that "Adults aged 18–64 should do at least 150 min of moderate-intensity aerobic physical activity or do

at least 75 min of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate and vigorous-intensity activity."<sup>[12]</sup> Although physical exercise has protective effects against seizures in epilepsy,<sup>[13]</sup> the previous studies have shown that patients with epilepsy were performing low-level activities related to stigma, overprotection, and fear of exacerbating seizures during exercise or sport.<sup>[13–16]</sup> Likewise, we found that most of our patients did not regularly engage in exercise/sports both before and during the COVID-19 lockdown.

We know that there was a strong link between physical activity and mental well-being.<sup>[17]</sup> Mandatory activity restrictions in the COVID-19 pandemic may induce psychological influences such as depression, anxiety, and stress.<sup>[18]</sup> Epilepsy patients had greater psychiatric comorbidities level during the COVID-19 outbreak compared to controls.<sup>[19,20]</sup> In our study, 34.0% of patients (based on cutoff point of the GAD-7 scale) had anxiety during the lockdown. Only a small minority of our population of patients (8.5%) had confirmed severe anxiety. The probable cause of this result may be the patient's perception, sociocultural characteristics, urban/rural lifestyle of patients, and degree of lockdown.

The lockdown status and fear of catching the COVID-19 infection may pose a threat to the possible changes in seizure frequency. In the previous studies looking at seizure control among epilepsy patients during the COVID-19 outbreak, the rate of seizure control status has varied. An increase in seizure frequency was reported by 8.56–30.0% of patients;<sup>[21–27]</sup> however, 56% of patients reported like usual of seizure frequency in a recent study.<sup>[28]</sup> Our study showed that the large majority of patients (93.6%) notified no changes in seizure frequency during the first wave of the COVID-19 pandemic.

Lockdown conditions are associated with negative clinical effects on the mental and physical health both for healthy individuals and for patients. The advice of the Epilepsy Society (2020) is to "Try to keep healthy by following a nutri-

tious diet and taking light exercise" during the COVID-19 pandemic. Patients should be advised to be active at home with physical exercise programs to prevent the destructive effects of inactivity.<sup>[11,29]</sup>

**Study Limitations**– There are some limitations in this study. First, the sample size was small. The results of our study should be verified in larger samples with controls. Second, the physical activity and anxiety levels of patients were interrogated with the self-reported questionnaires through phone interview, which may increase the risk of bias and insufficient recall. The objective monitors for physical activity and face-to-face structured interviews for anxiety were not used due to curfew and lockdown conditions.

**Conclusion**– This study demonstrates that the COVID-19 pandemic has detrimental effects on physical activity and anxiety of the patients with epilepsy. The patients with epilepsy should be encouraged to participate in regular physical activity to enhance both their physical and mental health at home during the national lockdown.

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**Informed Consent**– Verbal informed consent was obtained from all participants prior to the phone interview as stated in the approval received from Noninvasive Research Ethics Board of Dokuz Eylul University.

**Ethics Committee Approval**– The study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Republic of Turkey Ministry of Health and Noninvasive Research Ethics Board of Dokuz Eylul University (Protocol number: 5493-GOA; approval number: 2020/13-42).

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