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Original article

Depression and sexual functions in epilepsy patients: Comparison before and during the COVID-19 pandemic

Dépression et fonctions sexuelles chez les patients épileptiques : comparaison avant et pendant la pandémie COVID-19

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ABSTRACT

Objective. – The new coronavirus disease 2019 (COVID-19) is a major health problem with a high rate of spread. We aimed to investigate herein the effects of the COVID-19 outbreak on depression and sexual dysfunction in patients with epilepsy.

Material and Methods. – One hundred and sixteen epilepsy patients admitted to our hospital from October–November 2019 were evaluated for sexual functions and depression using the Arizona Sexual Experiences Scale (ASEX) and Beck Depression Scale, respectively. These scales were re-applied in June 2020 and July 2020 to assess the impact of the outbreak on sexual function and depression in the same group of patients. The demographic and clinical characteristics of the patients were recorded and analyzed in SPSS.

Results. – During the pandemic period, the total Beck Depression Scale values increased significantly in the patients with epilepsy compared to the pre-pandemic period ($P = 0.048$), and depressive symptoms showed an increasing trend ($P = 0.032$). Although an increase in sexual dysfunction was also recorded, it was not statistically significant compared to the pre-pandemic period. In eight patients (6.9%), seizure frequency increased during the pandemic period. In the multivariate analysis, the only parameter that predicted the increase in seizure frequency was the number of drugs used. The Beck Depression Scale values were positively correlated with total male/female ASEX values, age, marital status, duration of illness, and seizure frequency.

Conclusion. – The COVID-19 outbreak caused an increase in the tendency to depression in epilepsy patients and has also had a negative effect on sexual function. During public health outbreaks, clinicians should focus not only on seizure control in patients with epilepsy but also on their mental health.

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R É S U M É

Objectif. – La nouvelle maladie à coronavirus 2019 (COVID-19) est un problème de santé majeur avec un taux de propagation élevé. Nous visons à étudier ici les effets de l'épidémie de COVID-19 sur la dépression et la dysfonction sexuelle chez les patients atteints d'épilepsie.

Matériel et méthodes. – Cent seize patients atteints d'épilepsie admis dans notre hôpital d'octobre à novembre 2019 ont été évalués pour les fonctions sexuelles et la dépression en utilisant respectivement l'échelle des expériences sexuelles de l'Arizona (ASEX) et l'échelle de dépression de Beck. Ces échelles ont été réappliquées en juin 2020 et juillet 2020 pour évaluer l'impact de l'épidémie sur la fonction sexuelle et la dépression dans le même groupe de patients. Les caractéristiques démographiques et cliniques des patients ont été enregistrées et analysées dans SPSS.

Résultats. – Pendant la période pandémique, les valeurs totales de l'échelle de dépression de Beck ont augmenté de manière significative chez les patients atteints d'épilepsie par rapport à la période pré-

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pandémique ($p = 0,048$), et les symptômes dépressifs ont montré une tendance à la hausse ($p = 0,032$). Bien qu'une augmentation de la dysfonction sexuelle ait également été enregistrée, elle n'était pas statistiquement significative par rapport à la période pré-pandémique. Chez huit patients (6,9 %), la fréquence des crises a augmenté pendant la période pandémique. Dans l'analyse multivariée, le seul paramètre qui prédisait l'augmentation de la fréquence des crises était le nombre de médicaments utilisés. Les valeurs de l'échelle de dépression de Beck étaient positivement corrélées avec les valeurs ASEX totales des hommes/femmes, l'âge, l'état matrimonial, la durée de la maladie et la fréquence des crises.

Conclusion. – L'épidémie de COVID-19 a provoqué une augmentation de la tendance à la dépression chez les patients épileptiques et a également eu un effet négatif sur la fonction sexuelle. Pendant les flambées de santé publique, les cliniciens devraient se concentrer non seulement sur le contrôle des crises chez les patients atteints d'épilepsie, mais aussi sur leur santé mentale.

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1. Introduction

In late 2019, an atypical pneumonia outbreak known as coronavirus disease 2019 (COVID-19) was detected in Wuhan, China. This newly described zoonotic coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is characterized by rapid human-to-human transmission. It first expanded as an epidemic in China before subsequently becoming a global health emergency, with the World Health Organization (WHO) declaring COVID-19 as a pandemic in March 2020 [11,26].

Epilepsy is a chronic neurological disease with neurobiological, cognitive, psychological, and social effects. As with previous pandemics, outbreaks such as COVID-19 will likely have many negative social and psychological effects on society and individuals. Patients diagnosed with epilepsy and other chronic diseases are particularly likely to be affected by the COVID-19 outbreak, and there is still not enough information on this subject [1].

After the announcement of COVID-19 in China, an increase in negative emotions such as anxiety, depression, and anger and a decrease in sensitivity to social risks, positive emotions, and life satisfaction were detected [18]. At the same time, epilepsy has been shown to be significantly associated with depression, with depressive symptoms being present in 40–60% of epilepsy patients. The frequency of seizures, anticonvulsive drugs, and psychosocial factors can all contribute to the development of depression [30]. Additionally, sexual dysfunction is seen in 15–48% of patients with epilepsy. The causes of sexual dysfunction in these patients may include structural disorders in the brain, hormonal changes, stigmatization, and side effects of anti-epileptics. Other psychiatric diseases and social problems are also common in epilepsy patients, which may in turn lead to sexual dysfunction. Sexual dysfunction is more common in women than men [25,27].

The Beck Depression Scale is used in various clinical settings to measure the level of depression in patients. Likewise, the Arizona Sexual Experiences Scale (ASEX) is a reliable tool for identifying and measuring sexual dysfunction in a range of populations and variety of clinical settings. These questionnaires have rarely been applied to epilepsy patients, and there are few data on the impact of the COVID-19 pandemic on these patients [7,8].

In this study, epilepsy patients who were evaluated with the ASEX scale and Beck Depression Scale before the COVID-19 pandemic were re-evaluated during the pandemic period to examine the effects of the pandemic on sexual function and depression. Our study presents preliminary data on the effect of the COVID-19 pandemic on sexual function and depression in patients with epilepsy.

2. Material and Methods

A hundred and sixteen epilepsy patients admitted to our hospital during October and November 2019 were evaluated for sexual functions and depression, using The Arizona Sexual Experiences Scale (ASEX) and Beck Depression Scale. After the announcement of COVID-19 as a pandemic by the World Health Organization, these scales were repeated in the same group in June 2020 and July 2020 to evaluate the impact of the epidemic on sexual functions and depression in epilepsy patients.

Demographic and clinical data of the patients were recorded. Beck Depression Scale and The Arizona Sexual Experiences Scale (ASEX) questionnaires were administered to all patients with epilepsy included in the study, before and during the pandemic period.

Patients in the 18–65 age group who had focal or generalized epileptic seizures for at least 1 year and were diagnosed with definite epilepsy were included in the study. However, patients whose seizures were due to causes such as metabolic disorder, tumor mass or acute infection, or those with a history of psychiatric drug use and family use of psychiatric drugs were excluded from the study. Among the patients who participated in the pre-pandemic questionnaire, those who could not be reached or followed during the pandemic period were also excluded from the study. The interviews were conducted during the interictal period. Written informed consent was obtained from the volunteer patients. Approval was obtained from the Ethics Committee of Bakirkoy Dr Sadi Konuk Training and Research Hospital and the Ministry of Health.

Beck Depression Scale was used in this study. The validity and reliability study of the scale was conducted in our country. The Beck Depression Scale consists of 21 items that used to measure symptoms related to emotional, cognitive, physical and motor functions in depression. The total score is obtained by summing the scores corresponding to each item marked by the individual. This is a 21-item self-assessment scale that tests characteristic behavior and symptoms of depression, with 0–9 points for normal, 10–18 points for mild depression, 19–29 points for moderate depression, 30–63 points for severe depression [14,20,28].

The Arizona Sexual Experiences Scale (ASEX) is a five-item, self-administered questionnaire developed to detect and monitor sexual dysfunction in depressive patients. ASEX consists of sex drive, arousal, penile erection/vaginal lubrication, the ability to reach orgasm, and orgasm satisfaction [19]. Soykan conducted a Turkish validity and reliability study of ASEX in patients with end-stage renal disease [24]. The male and female versions of ASEX differ in penile erection and vaginal lubrication, but other features

are similar. Each item is graded from 1 to 6 with possible total scores ranging from 5 to 30, sexual dysfunction is defined as total score of 19 or more, or 5 or more on any item, or 4 or more on three items and strongly correlates with clinically defined sexual dysfunction [23].

2.1. Statistical Analysis

Statistical analysis was performed using the statistical software SPSS 17.0 for Windows (SPSS, Inc). A P -value < 0.05 was considered significant. Continuous variables were expressed as mean \pm standard deviation, and categorical variables were expressed as percentages. Paired sample test was used to compare numerical data of study patients before and during COVID-19 outbreak, and Wilcoxon test was used to compare non-parametric data. The Spearman correlation coefficient was calculated to compare two datasets. For multivariate analysis, possible factors determined by univariate analysis ($P < 0.1$), further logistic regression analysis was performed to identify independent predictors of increased seizure frequency in COVID-19 period.

3. Results

A hundred and sixteen patients who were evaluated with a diagnosis of epilepsy before COVID-19 were reevaluated during the COVID-19 pandemic period. The patients had a median age of 33 years and consisted of 51 males and 65 females between the ages of 18–65. While there were eight (6.9%) patients with increased seizure frequency, there were two patients (1.7%) who had difficulty in accessing drugs during the pandemic period. Table 1 summarizes the main demographic and clinical characteristics of the study groups.

Table 2 shows the Beck Depression Scale values before and during the COVID-19 period. During the pandemic period, the total Beck Depression Scale values increased significantly compared to the pre-pandemic period ($P = 0.048$). In the study, a decrease was observed in 9 patients, an increase in 23 patients, and no change in 84 patients out of the values of a total of 116 patients. The patient group had a tendency to depression during the pandemic period ($P = 0.032$).

Table 3 shows the Arizona Sexual Experiences Scale (ASEX) values before and during the COVID-19 period. 49 male and 49 female patients participated in this questionnaire. Although impairment was observed in sexual functions during the pandemic period, it was not statistically significant compared to the pre-pandemic period.

In the univariate and multivariate logistic regression analysis, the independent parameters affecting the frequency of seizures in the COVID-19 period are shown in Table 4. Beck Depression Scale, lack of access to drugs, number of drugs, and duration of illness were evaluated with univariate analysis. In the multivariate analysis, only the number of drugs predicted an increase in seizure frequency. Correlation analysis of Beck Depression Scale and other parameters is shown in Table 5. Beck Depression Scale positively correlated with total ASEX values, age, marital status, duration of illness and increased seizure frequency. In addition, a negative correlation was observed between Beck Depression Scale and education level.

4. Discussion

In this study, we evaluated the impact of the COVID-19 outbreak on sexual function and depression in patients with epilepsy. During the pandemic period, the total Beck Depression Scale values increased significantly compared to the pre-pandemic

Table 1
Demographic characteristics of epilepsy patients ($n = 116$).

Age, median (min-max)	33 (18–65)
Female, n (%)	65 (56.0)
Male, n (%)	51 (44.0)
Smoker, n (%)	22 (19)
Alcohol use, n (%)	8(6.9)
Number of drugs	
Single drug, n (%)	68 (58.6)
Dual drugs, n (%)	35 (30.2)
Multidrug, n (%)	13 (11.2)
Educational level	
Primary school, n (%)	26 (22.4)
Middle School, n (%)	19 (16.4)
High school, n (%)	36 (31.0)
University, n (%)	35 (30.2)
Marital status	
Single, n (%)	52 (44.8)
Married, n (%)	60 (51.7)
Divorced, n (%)	4 (3.4)
Disease onset age, years	17.4 \pm 9.1
Duration of illness, years	16.8 \pm 10.3
Seizure type	
Focal, n (%)	37 (31.9)
Generalized, n (%)	79 (68.1)
Seizure frequency	
More than 1 month, n (%)	6(5.2)
1 month to 1 year, n (%)	39(33.6)
Less than 1 year, n (%)	71(61.2)
EEG findings	
Normal, n (%)	40(34.5)
Generalized, n (%)	50(43.1)
Focal, n (%)	26(22.4)
The number of patients whose seizure frequency increased during the pandemic period, n (%)	8(6.9)
The number of patients experiencing difficulties in drug supply during the pandemic period, n (%)	2(1.7)

Mean values (standard deviation) and % (n) are reported for continuous and categorical variables, respectively.

Table 2
Total Beck Depression Scale values before and during COVID-19 period.

	Before COVID-19 ($n = 116$)	During COVID-19 ($n = 116$)	P
Total Beck Depression Scale values	11.53 \pm 9.4	12.54 \pm 11.3	0.048
No depression	59(50.9)	57 (49.1)	0.032
Mild depression	37 (31.9)	32 (27.6)	
Moderate depression	13 (11.2)	14 (12.1)	
Severe depression	7(6)	13(11.2)	

period ($P = 0.048$). Patients showed a greater tendency to experience depressive symptoms during the pandemic period ($P = 0.032$). Although there was also impairment in sexual function, it was not statistically significant compared to the pre-pandemic period. In eight (6.9%) patients, seizure frequency increased. The only parameter predicting the increase in seizure frequency in the multivariate analysis was the number of drugs used for epilepsy. To the best of our knowledge, this study presents the first information on this subject in the literature.

Over the centuries, new types of viruses such as influenza have led to widespread epidemics and pandemics. These can cause significant mortality and have many negative social and psychological impacts on society and individuals [1]. Notably, the neurotropic and neuroinvasive abilities of new types of coronaviruses have been described in humans. For example, symptoms such as febrile seizures, loss of consciousness, convulsions, encephalomyelitis and encephalitis have been observed in patients with COVID-19 infection [2]. It has been suggested that the angiotensin-converting enzyme could be a potential target of

Table 3
The Arizona Sexual Experiences Scale values before and during COVID-19 period.

Male	Before COVID-19 (n:49)	During COVID-19 (n:49)	
Sex drive	2.37 ± 1.4	2.55 ± 1.2	0.25
Arousal	2.47 ± 1.4	2.57 ± 1.2	0.46
Penile erection	2.45 ± 1.2	2.55 ± 1.3	0.34
The ability to reach orgasm	2.53 ± 1.2	2.71 ± 1.2	0.07
Orgasm satisfaction	2.26 ± 1.1	2.39 ± 1.0	0.16
Total male score	12.14 ± 4.8	12.65 ± 4.6	0.14
Male sexual dysfunction, n (%)	11 (22.4)	12(24.5)	0.71
Female	Before COVID-19 (n:49)	During COVID-19 (n:49)	
Sex drive	3.0 ± 1.3	3.29 ± 1.3	0.07
Arousal	3.04 ± 1.1	3.32 ± 1.2	0.12
Vaginal lubrication	2.94 ± 1.1	3.02 ± 1.3	0.59
The ability to reach orgasm	3.12 ± 1.4	3.45 ± 1.4	0.10
Orgasm satisfaction	2.56 ± 1.3	2.56 ± 1.5	0.91
Total female score	14.78 ± 4.8	15.78 ± 5.4	0.12
Female sexual dysfunction, n (%)	19(38.8)	23(46.9)	0.16

SARS-CoV-2 for the central nervous system because two receptors were detected on the surface of glial cells and neurons [6]. Based on previous studies, the rate of neurological comorbidity is not assumed to be higher for COVID-19 than for other respiratory viral infectious diseases. Although it has been claimed that patients with epilepsy are not more likely to be infected by coronavirus or to have severe COVID-19 symptoms, the management of COVID-19 in these patients is more complex than in individuals without chronic disease [3]. However, epilepsy patients infected with COVID-19 or other infectious diseases may have fever, which can possibly trigger seizures.

Depression is the most common psychiatric comorbidity in patients with epilepsy, and its prevalence is higher than in the general population. The frequency reported in studies is highly variable (30–70%). In our study, we encountered symptoms of depression in about half of our patients, and an increase in depression severity was observed during the pandemic period. The etiology of depression is multifactorial and results from complex interactions between endogenous, genetic, therapeutic, and environmental factors [9,10,17]. In addition, sexual dysfunction is a common comorbidity that negatively affects the quality of life in patients with epilepsy. About half of men and women with epilepsy have sexual dysfunction, but in the majority, this is usually not noticed. In our study, sexual dysfunction was found in 22.4% of men before the pandemic and in 24.5% during the pandemic period, whereas it was found in 38.8% of women before the pandemic and in 46.9% during the pandemic period. In general, patients with uncontrolled epilepsy, longer duration of illness, focal epilepsy, and higher seizure frequency, and patients taking

Table 4
Univariate and multivariate analyses for independent predictors of increase in seizure frequency in COVID-19 period.

	Univariate			Multivariate		
	OR	CI	P	OR	CI	P
Beck Depression Scale	1.065	1.012–1122	0.016	1.070	0.988–1.158	0.97
The number of drugs used	5.294	1837–15.259	0.002	4.405	1.472–13.178	0.008
Duration of illness	1.049	0.992–1.109	0.094	1.017	0.947–1.092	0.64
Lack of access to drugs	15.286	0.862–271.04	0.063	21.517	0.647–715.7	0.86

OR: odds ratio; CI: confidence interval.

Table 5
Correlation analysis of Beck Depression Scale and other parameters.

	Beck Depression Scale	
	r	P
Male total ASEX values	0.394	0.005
Female total ASEX values	0.430	0.002
Age	0.362	0.001
Marital status	0.262	0.005
Educational level	–0.303	0.001
Duration of illness	0.265	0.004
Increased seizure frequency	0.244	0.008

ASEX: Arizona Sexual Experiences Scale.

enzyme-inducing and multiple antiepileptic drugs (AEDs) are more likely to have sexual dysfunction. Multiple other mechanisms, including the direct effects of epilepsy, effects of AEDs, and psychosocial factors, contribute to sexual dysfunction in patients with epilepsy [22]. In our study, the Beck Depression Scale showed a positive correlation with total male/female ASEX values, age, unmarried status, duration of illness, and seizure frequency. In addition, a negative correlation was observed between the Beck Depression Scale and educational level or, specifically, as the educational level of the patients increased, depression scores decreased.

Attention should be placed on the interactions between AEDs and COVID-19 drugs. Since COVID-19 infection may cause an increase in seizure frequency and duration, the AEDs of patients whose seizures are well controlled should not be changed. In addition, the effect of AEDs on depression and sexual function should also be considered. Herein, it was found that relatively few patients with epilepsy experienced an increase in seizures during the COVID-19 outbreak. However, stress is an independent trigger known to induce seizures in these patients [15]. Also, in previous studies, epilepsy patients have self-described themselves as less valuable, unable to adapt, less reliable, less mature, more unstable, less successful, and less compliant. In addition, low self-perception, high anxiety levels, and depression have been related associated with epilepsy-related stigma [16,29]. If epilepsy patients have symptoms of stress and depression, treatment should be given accordingly. In our previous study at our center, we also evaluated drug compliance and stigmatization. The COVID-19 outbreak further motivated and informed patients about drug adherence in the patient group and had no effect on stigmatization. Although the COVID-19 pandemic did not adversely affect drug compliance and stigmatization, the patients did show a tendency to experience impaired sexual function and depression [11]. Epidemics can negatively affect patients with chronic illnesses in numerous other ways. For example, patients may have problems accessing healthcare facilities or medication due to the epidemic. However, in Turkey, the medical reports of those with chronic diseases such as epilepsy have been extended and private pandemic hospitals have been established. Thus, those

with epilepsy and other chronic illnesses had no significant problems with accessing healthcare facilities or medicines. In our study, only two patients expressed difficulty in accessing medications. In the context of a pandemic, telemedicine should be promoted and expanded to reduce the risk of disease transmission, especially through video consultations.

Looking at previous experiences, such as the SARS epidemic in Taiwan in 2003, 22% of epilepsy patients experienced difficulty in obtaining health care, and the frequency of seizures increased in 12% of patients [21]. During the COVID-19 epidemic in Iran, approximately one-third of patients with epilepsy experienced difficulty in accessing their medications, while the frequency of seizures increased in 6% of patients in about one month [4]. Similarly, in an Italian-based study during the COVID-19 outbreak, patients with epilepsy were shown to face difficulties in attending follow-up appointments, and an 18% increase in the number of seizures was noted. Also, epilepsy patients had worse depressive and anxiety symptoms than those without epilepsy; however, sleep quality was similar in both groups. In particular, the increase in seizures was most associated with the number of anti-seizure medications and sleep disturbances [5]. In our study, an increase in seizure frequency was found in 6.9% of patients four months into the COVID-19 epidemic period. However, the increase in seizure frequency was only found to be related with the number of drugs used.

Hoa and colleagues compared the mental health status of epilepsy patients in southwestern China with healthy controls during the COVID-19 outbreak. They investigated risk factors for severe psychological distress and found that 13.1% of epilepsy patients had severe psychological stress compared with 1.6% of healthy controls. They also found that the diagnosis of drug-resistant epilepsy and time spent watching daily media coverage of the COVID-19 outbreak were associated with severe psychological distress among epilepsy patients during the epidemic [13]. Although there was no healthy control group in our study, a significant tendency of increasing depressive symptoms and deterioration in sexual functions was observed in epilepsy patients. The number of patients with severe depression was 6% before the pandemic, but increased to 11.2% during the pandemic. According to the assessment of the WHO, pandemics can threaten mental health. Although scientific information can help people to better understand the nature of pandemics, the simultaneous flood of disaster-related information can cause anxiety and panic in the public. In particular, the psychological effects of pandemics should not be ignored, and precautions should be taken [12].

5. Limitations of the study

The study was carried out at a single medical center, and the number of patients was limited. The number of patients was not sufficient because the men and women were analyzed separately, as is indicated for the ASEX assessment. Additionally, the study did not compare epilepsy patients with healthy controls, which could have provided more valuable data. Finally, quality of life and anxiety were not evaluated.

6. Conclusion

Pandemics have many negative social and psychological effects on society and individuals. During the pandemic period, an increase in the frequency of seizures was observed in patients with epilepsy despite the lack of any significant problems in accessing antiepileptic drugs. Also, we found that the current COVID-19 epidemic increased the tendency of depressive symptoms in these patients. An increase in sexual dysfunction was also encountered,

although it was not statistically significant compared to the pre-pandemic period. During public health outbreaks such as COVID-19, clinicians should focus not only on seizure control in patients with epilepsy but also on their mental health.

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Disclosure of interest

The authors declare that they have no competing interest.

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