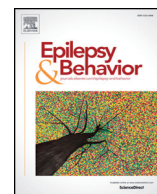




Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Brief Communication

Incidence of anxiety in epilepsy during coronavirus disease (COVID-19) pandemic

Mehri Salari^a, Masoud Etemadifar^b, Koroush Gharagozli^c, Koorosh Etemad^d,
Farzad Ashrafi^a, Helia Ashourizadeh^{a,*}

^a Functional Neurosurgery Research Center, Shohada Tajrish Neurosurgical Center of Excellence, Shahid Beheshti University of Medical Sciences, Tehran, Iran

^b Department of Functional Neurosurgery, Medical School, Isfahan University of Medical Science, Isfahan, Iran

^c Loghman Medical and Educational Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

^d Department of Epidemiology, School of Public Health and Safety, Shahid Beheshti University of Medical Sciences, Tehran, Iran

ARTICLE INFO

Article history:

Received 18 June 2020

Revised 8 August 2020

Accepted 12 August 2020

Available online 17 September 2020

Keywords:

Epilepsy

Seizure

Anxiety

Coronavirus disease

Pandemic

ABSTRACT

Purpose: The coronavirus disease 2019 (COVID-19) pandemic has affected people globally, and people with chronic diseases are suffering more in maintaining their mental and physical health.

Method: This cross-sectional, case-control study assessed the anxiety level in people with epilepsy compared with the general population.

Results: The results showed that 13.5% of patients had experienced a severe level of anxiety, but the mean anxiety level between groups did not show significant difference.

Conclusion: Although still many aspects of the pandemic on people with epilepsy are yet to be determined, active investigation of psychological sequels of the pandemic is demanded.

© 2020 Elsevier Inc. All rights reserved.

1. Introduction

Epilepsy is a chronic neurologic disease that has affected around 50 million people worldwide. Depression and anxiety are the most common neuropsychiatric comorbidities in people with epilepsy. The pooled prevalence of anxiety among people with epilepsy has found to be 20.2% with more incidence in patients with drug-resistant epilepsy [1]. Based on the diagnosis method, there may be considerable variance in the incidence of anxiety and other neuropsychiatric disorders among people with epilepsy [2,3]. However, the impact of anxiety on patients' quality of life, seizures' control, and treatment response are significant [4,5].

The coronavirus disease 2019 (COVID-19) was declared a pandemic in the mid-March 2020. Pandemics are major worldwide health crises, possessing potential and serious risks to not only physical but also psychological health. Besides the fact that people with chronic diseases may experience more from the severe form of the disease [6], they also may face more challenges regarding maintaining their routine medical care for their underlying condition.

Considering the complications of anxiety in the overall health quality of these patients, especially during crisis, this study was conducted

to assess the anxiety level in people with epilepsy compared with the general population during COVID-19 pandemic to enlighten the challenges and solutions for better care in people with epilepsy.

2. Method

This study is a cross-sectional, case-control survey approved by the Iran National Committee for Ethics in Biomedical Researches (IR.SBMU.RETECH.REC.1399.155) to assess the level of anxiety among people with epilepsy as compared with the general population in the time of COVID-19 pandemic. The anxiety level was assessed by the Beck Anxiety Inventory II-Persian (BAI-II) in Persian language, which was validated previously [7]. In order to reduce the risk of a person-to-person transmission, the questionnaire was broadcasted on a web-based platform among the participants. The questionnaire was sent to all patients who were being followed up in two referral clinics at Shahid Beheshti and Isfahan Universities of Medical Sciences. Complete description of the study was provided to participants before entering the survey by telephone call. The patients who had any medical history of psychosis or a Mini-Mental State Examination (MMSE) score of ≤ 12 were excluded from the study [8]. For the control group, the questionnaire was broadcasted over Wechat public messenger platform, commonly used in the country. History of any neurologic diseases was the exclusion criteria for the control group [9]. Statistical analysis was performed via

* Corresponding author at: Department of Neurology, Shohada Tajrish Hospital, Tehran, Iran.

E-mail address: ashourizadehhelia@sbmu.ac.ir (H. Ashourizadeh).

IBM® SPSS® Statistics software (version 25.0). The significance level was defined as 0.05.

3. Results

In total, 141 subjects with epilepsy and 759 subjects in the control group after matching their age and gender were included in the study. The demographic data as well as disease- and COVID-19-related variables are provided in Table 1.

The mean BAI-II total score among the patient and control group was 11.82 ± 9.71 and 10.28 ± 8.98 , respectively, with no statistically significant difference. Based on the total BAI-II score, 13.5% of patients and 6.9% of controls have experienced severe level of anxiety, which was statistically significant difference among the patient and control groups. Most of patients and the controls experienced minimal level of anxiety, 45.4% and 48.7%, respectively. The mean BAI-II total score in the control group was 10.28. The anxiety in men of younger ages was significantly higher in the control group. There was no correlation between anxiety, age, and gender in the patient group.

In our study, only four patients had confirmed COVID-19 infection. In contrast to the patient group, the severity of anxiety in the control group was related to being infected with COVID-19. In both groups, the anxiety level was higher if one of the relatives had been infected with COVID-19. The sleep pattern and appetite change were seen mostly in participants who have experienced more severe anxiety.

During the pandemic, 3.6% of patients reported exacerbation in their symptoms, and 6.8% of them reported an increase in their medications. There was no correlation between epilepsy duration, epilepsy type, and level of anxiety. In contrast, patients who had at least one underlying chronic medical condition experienced more anxiety. Table 2 provides more details about the patient group characteristics.

4. Discussion

Our findings suggested that the anxiety level of people with epilepsy is not significantly higher than the general population without epilepsy. A recent study that assessed the anxiety level in people with epilepsy reported significantly higher anxiety level among patients in contrast to the general population [10]. This discrepancy in findings may be related

Table 1
Demographic-, COVID-19-, and anxiety-related characteristics of patients and controls.

Demographic information				
Mean age (year)	Patients			
	36.01 ± 19.78			
Gender (M/F)	Male (%)		Female (%)	
	44.6		55.4	
Level of education	Patients (%)		Control (%)	
	Illiterate	4.2	0.6	
	Primary school	23.4	9.6	
	High school diploma	28.4	21.2	
	Associate's degree	8.5	7.7	
	Bachelor's degree	25.5	33.5	
	Master's degree	9.2	15.4	
	Doctoral degree	0.7	11.7	
	Patients	Control	P-value	
COVID-19-related questions (%)				
Infected by COVID-19	2.1	2.5	0.539	
Family members infected by COVID-19	12.0	12.5	0.504	
Sleep problems since COVID-19 pandemic	20.5	25.4	0.011	
Appetite change since COVID-19 pandemic	8.5	16.8	0.001	
BAI-II results				
Mean BAI-II total score	11.82	10.28	0.067	
Anxiety severity	No anxiety (%)	45.4	48.7	0.083
	Mild anxiety (%)	25.5	29.1	0.075
	Moderate anxiety (%)	15.6	15.3	0.403
	Severe anxiety (%)	13.5	6.9	0.009

Table 2
Epilepsy-related characteristics of patients.

Disease duration (year)	Less than 5 (%)	32.8	
	5–10 (%)	35.8	
	More than 10 (%)	31.4	
Epilepsy type	Focal-onset (%)	29.8	
	Generalized-onset (%)	59.6	
	Unknown (%)	10.6	
Last seizure	In the last 4 months (%)	36.9%	
	Last 4–12 months (%)	20.6	
	More than 1 year ago (%)	40.9	
Hospital admission due to seizure in the pandemic (%)		6.4	
Believe that COVID-19 pandemic has exacerbated your epilepsy symptoms (%)		3.5	
Inaccessibility to means of ordering medications during COVID-19 pandemic (%)		21.2	
Increased epilepsy medication during COVID-19 pandemic (%)		6.3	
Preexisting medical condition (rather than epilepsy)	Hypertension (%)	7.0	
	Hypothyroidism (%)	2.8	
	Hyperlipidemia (%)	2.8	
	Asthma (%)	2.1	
	Obesity (%)	1.4	
	Diabetes (%)	0.7	
	Rheumatoid arthritis (%)	0.7	
	Epilepsy medications	Sodium valproate (%)	43.3
		Levetiracetam (%)	41.8
		Carbamazepine (%)	32.6
Lamotrigine (%)		19.1	
Phenobarbital (%)		12.1	
Oxcarbamazepine (%)		7.0	
Phenytoin (%)		5.7	
Topiramate (%)		5.7	
Clobazam (%)		4.3	
Primidone (%)		2.8	
Acetazolamide (%)		2.1	
Ethosuximide		1.4	
Other medications		Antihypertensive (%)	7.0
	Selective serotonin reuptake inhibitor (%)	5.6	
	Benzodiazepine (%)	4.9	
	Thyroid medication (%)	4.2	
	Antihyperlipidemic (%)	3.5	
	Asthma drugs (%)	2.1	
	Aspirin (%)	2.1	
	Risperidone (%)	0.7	
Tricyclic acid (%)	0.7		

to background situation of COVID-19 pandemic in the regions where the studies were conducted, facilities in the national healthcare systems provided to people with epilepsy, or a higher anxiety level among the general population. A recent study conducted to assess the anxiety level in Iranian general population showed similar pattern of anxiety in the general population to our study; however, the underlying medical conditions including epilepsy was not determined in the study [11].

In this survey, participants with epilepsy and other chronic conditions experienced more anxiety compared with people with epilepsy with no other chronic conditions. This finding may be the consequence of the public awareness that people with chronic underlying conditions may infect more by COVID-19 and experience more severe condition that those without any chronic conditions. Although seizure as a manifestation of COVID-19 has been reported [12,13], there is no evidence of an increased tendency for people with epilepsy to develop COVID-19 infection.

In accordance with other chronic conditions' challenges regarding maintaining routine medication adherence [09], our study showed that one in five people with epilepsy declared experiencing difficulties in accessing their routine epilepsy medication(s) in the pandemic crisis. Also, 6.3% of patients had increased their medication dosage since the pandemic.

Of the 500 patients who were sent a questionnaire, only 141 answered. Therefore, although our results did not show increase total level of anxiety among patients with epilepsy compared with the general population, severe anxiety was significantly higher in people with

epilepsy. On the other hand, patients with lower educational level, lower socioeconomic condition, and older age who seemed to be more prone to the consequence of pandemic did not answer to the questionnaire.

Acknowledgment

None.

Declaration of competing interest

None.

Funding sources

This work was supported by the Functional Neurosurgery Research Center, Shohada Tajrish Neurosurgical Center of Excellence, Shahid Beheshti University of Medical Sciences.

References

- [1] Scott AJ, Sharpe L, Hunt C, Gandy M. Anxiety and depressive disorders in people with epilepsy: a meta-analysis. *Epilepsia*. 2017;58(6):973–82.
- [2] Zingano B de L, Guarnieri R, Diaz AP, Schwarzbald ML, Wolf P, Lin K, et al. Hospital Anxiety and Depression Scale-Anxiety subscale (HADS-A) and the State-Trait Anxiety Inventory (STAI) accuracy for anxiety disorders detection in drug-resistant mesial temporal lobe epilepsy patients. *J Affect Disord*. 2019;246:452–7.
- [3] Gandy M, Sharpe L, Perry KN, Miller L, Thayer Z, Boserio J, et al. Anxiety in epilepsy: a neglected disorder. *J Psychosom Res*. 2015;78(2):149–55.
- [4] Johnson EK, Jones JE, Seidenberg M, Hermann BP. The relative impact of anxiety, depression, and clinical seizure features on health-related quality of life in epilepsy. *Epilepsia*. 2004;45(5):544–50.
- [5] Nogueira MH, Yasuda CL, Coan AC, Kanner AM, Cendes F. Concurrent mood and anxiety disorders are associated with pharmacoresistant seizures in patients with MTL. *Epilepsia*. 2017;58(7):1268–76.
- [6] Emami A, Javanmardi F, Pirbonyeh N, Akbari A. Prevalence of underlying diseases in hospitalized patients with COVID-19: a systematic review and meta-analysis. *Arch Acad Emerg Med*. 2020;8(1):e35.
- [7] Kaviani HMAS. Psychometric properties of the Persian version of Beck Anxiety Inventory (BAI). *Tehran Univ Med J*. 2008;65(2):136–40.
- [8] Chuquilín-Arista F, Álvarez-Avellón T, Menéndez-González M. Prevalence of depression and anxiety in Parkinson disease and impact on quality of life: a community-based study in Spain. *J Geriatr Psychiatry Neurol*. 2019;33(4):207–13.
- [9] Salari M, Zali A, Ashrafi F, Etemadifar M, Sharma S, Hajizadeh N, et al. Incidence of anxiety in Parkinson's disease during the coronavirus disease (COVID-19) pandemic. *Mov Disord*. 2020;35(7):1095.
- [10] Hao X, Zhou D, Li Z, Zeng G, Hao N, Li E, et al. Severe psychological distress among patients with epilepsy during the COVID-19 outbreak in southwest China. *Epilepsia*. 2020 [epi.16544].
- [11] Moghanibashi-Mansourieh A. Assessing the anxiety level of Iranian general population during COVID-19 outbreak. *Asian J Psychiatr*. 2020;51:102076.
- [12] Moriguchi T, Harii N, Goto J, Harada D, Sugawara H, Takamino J, et al. A first case of meningitis/encephalitis associated with SARS-coronavirus-2. *Int J Infect Dis*. 2020;94:55–8.
- [13] Vollono C, Rollo E, Romozzi M, Frisullo G, Servidei S, Borghetti A, et al. Focal status epilepticus as unique clinical feature of COVID-19: a case report. *Seizure*. 2020;78:109–12.