



# Review Article: Psychological Distress in Patients With Multiple Sclerosis and Epilepsy in the COVID-19 Pandemic: A Systematic Review



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**Running Title** Psychological Distress in MS and Epilepsy Patients and COVID-19

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## ABSTRACT

**Background:** The COVID-19 pandemic can cause various anxiety, fear, and tension in society. The negative impact of the pandemic is not limited to physical health problems. It can generate serious consequences, such as anxiety, depression, and stress, especially neurological diseases.

**Objectives:** The present study investigated depression, anxiety, and stress in patients with MS and epilepsy during the COVID-19 pandemic.

**Materials & Methods:** In this study, the keywords depression, anxiety, stress, multiple sclerosis, epilepsy, and COVID-19 in the title and abstract of articles published in 2020 (May) and 2021 (July) in reputable international scientific databases, including Google Scholar, PubMed, Scopus, EMBASE, and PsycINFO were searched. The PRISMA checklist was used to review and control the quality of articles.

**Results:** Overall, 394 English articles were retrieved. Finally, 27 final articles were selected for comprehensive review and data extraction. The obtained results suggested that patients with MS and epilepsy experienced depression, anxiety, stress, fear, poor sleep quality, mental fatigue, and poor quality of life during the COVID-19 pandemic. Quarantine has limited patients' access to medication and treatment, resulting in increased seizures and disease severity.

**Conclusion:** The COVID-19 pandemic reduced patients' mental health with MS and epilepsy. The psychological consequences of the outbreak of COVID-19 might be associated with patients with MS and epilepsy for years; thus, it is necessary to adopt psychological interventions to reduce psychological distress in these patients.

**Keywords:** Coronavirus, Depression, Anxiety, Stress, Multiple Sclerosis (MS), Epilepsy

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## Highlights

- Patients with Multiple Sclerosis (MS) and epilepsy experienced depression, anxiety, stress, fear, poor sleep quality, mental fatigue, and poor quality of life during the Coronavirus Disease 2019 (COVID-19) pandemic.
- Quarantine has limited patients' access to medication and treatment, resulting in increased seizure attacks and disease severity.
- Factors such as female gender, loneliness, economic problems, the lack of social support, old age, and the lack of exercise also affected the severity of depressive symptoms, stress, and anxiety in patients with MS and epilepsy during the COVID-19 pandemic.

## Introduction

**C**oronavirus Disease 2019 (COVID-19) first spread in Wuhan, China, on December 17, 2019. The World Health Organization (WHO) recognized it further as a pandemic on March 11, 2020 [1]. Like a pandemic, COVID-19 can arise an array of emotions, hysterics, fear, and tension in society [2]. The adverse effects of pandemics are not restricted to physical health predicaments; they can also lead to severe consequences, such as anxiety, depression, and stress in individuals [3, 4]. Previous studies suggest that mental distress is a significant response to pandemics.

Furthermore, it is much more recognizable in the early stages of the outbreak [5, 6]. Scientists reported that 36.4% of individuals diagnosed with COVID-19 present mental symptoms in addition to systemic, respiratory symptoms, such as headache, consciousness, and paresthesia. These mental symptoms are more likely to appear in more severe COVID-19 cases than milder and moderate ones [7]. Besides, autopsy reports of deceased patients reveal minor nervous deterioration in them [8]. In addition to mentioned signs, cases of viral encephalitis caused by COVID-19 due to virus attacks on the Central Nervous System (CNS) have also been reported. Laboratory tests on cerebrospinal fluid also reveal this virus's potential (threat) in critically damaging the nervous system [9].

In this regard, patients with epilepsy and MS whose CNS is damaged are more vulnerable to illness due to COVID-19 [10, 11]. MS is a chronic progressive disease that damages the myelin of the CNS and affects sensory and motor functions [12]. As a multidimensional and multifactorial phenomenon, stress might be a complication of MS and a factor in exacerbating or recurring the symptoms of the disease [13]. Depression and anxiety

are also major mental disorders in patients with MS. The causes of depression and anxiety in these patients remain undiscovered; nonetheless, a combination of psychosocial, neurological, and disease-related factors may be involved [10-14]. Altogether, MS patients endure much higher stages of mental disorders such as depression, stress, and anxiety when compared to the healthy population. Such symptoms may root in the direct influence of inflammation and demyelination on nerves or the mental effects of MS chronic condition [15, 16].

Epilepsy also refers to recurrent seizures that occur due to sudden depletion and excessive intermittent discharges of brain neurons [17]. Anatomical disorders, such as temporal lobe tumors, cerebrovascular disorders, dead tissue in parts of the brain, including the hippocampus, trauma, fetal injuries, fever, temperature changes, and medications are some causes of epilepsy [18]. In addition to the physical problems associated with epilepsy, epilepsy patients also suffer from other psychosocial conflicts; especially during the COVID-19 pandemic, numerous patients experienced multiple seizures due to stress and anxiety [19]. Epilepsy, alongside depression, has profound effects on the patient's life, leading to decreased daily functioning and quality of life, decreased academic achievements in children and adolescents, reduced marriage rates, increased unemployment, seizures, high mortality, and an increased requirement to medical treatments [20]. Anxiety can result from the unpredictability of seizures, decreased physical activity, self-worthlessness, or social exclusion [20, 21].

Enjoying decent mental health facilitates the process of various treatments, especially for people with MS and epilepsy [22, 23]. In addition to physical care during the COVID-19 pandemic, individuals with MS and epilepsy also appear to require psychological support. Many of these people experience extra stress as they are suggested vulnerable and need more care [24, 25]. Therefore,

if they do not receive well-time interventions, they can be expected to suffer from incurable depression and anxiety [26]. In this regard, a study by Costabile examined the psychological distress of patients with MS during the COVID-19 pandemic. The results indicated that patients with MS had higher depression, anxiety, and insomnia rates than normal people. The patient's attitude towards the current situation influenced their mental health [27]. Patients who were passive and identified themselves as being cognitively dysfunctional experienced high levels of depression. Abokalawa studied the effects of the COVID-19 pandemic on the lives of epilepsy patients. The obtained findings suggested that 55.6% of patients reported poor sleep quality. Furthermore, 66.2%, 77.2%, and 75.5% of patients developed depression, anxiety, and stress, respectively. Additionally, 23% of patients reported increased seizures during the COVID-19 pandemic [28].

Altogether, studies indicate the prevalence of psychological disorders in patients with MS and epilepsy. It is almost two years since the outbreak of the COVID-19 pandemic, and this lethal virus keeps mutating; thus, it seems necessary to pay attention to the psychological consequences of this pandemic in addition to physical examinations, especially on people with chronic neuropsychiatric disorders who are categorized in high-risk groups and whose mental health is affected by COVID-19 and its related news [29, 30]. In this regard, the present study aimed to investigate the depression, anxiety, and stress among patients with MS and epilepsy during the COVID-19 pandemic.

## Materials and Methods

### Search strategy

The present systematic review was performed through the PRISMA checklist examined research findings related to depression, anxiety, and stress in patients with MS and epilepsy during the prevalence of COVID-19 [31]. Articles indexed were used in scientific databases such as Google Scholar, PubMed, ISI, Scopus, EMBASE, and PsycINFO. Using the specified keywords, researchers in this study searched and extracted helpful English articles published in 2020 (May) and 2021 (July) from reliable electronic sources. By reviewing the full texts of these articles, the data were reported in a categorized manner.

### Keywords

The combinations of the following keywords were used in the search strategy: (Multiple Sclerosis) OR

(MS) (title/abstract) OR (Epilepsy) (title/abstract) AND (Coronavirus 2019) OR (COVID-19) (title/abstract) AND (Anxiety) OR (Distress) OR (Depression) OR (Sad) OR (Stress) OR (Tension) (title/abstract).

### Exclusion and inclusion criteria

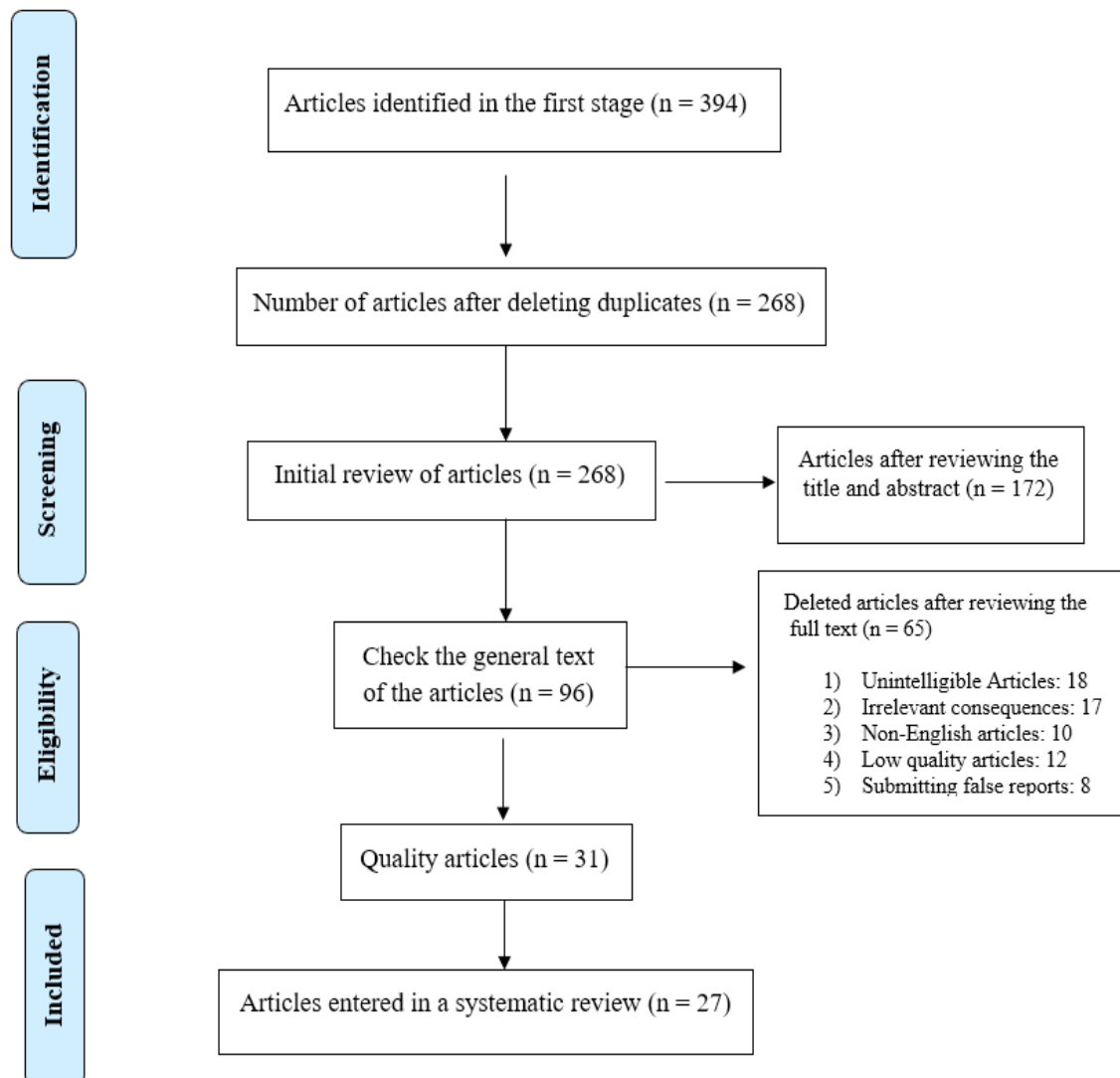
Research articles were purposefully selected based on the criteria of exclusion (the unavailability of full text of the article, letter to the editor, & no abstract) and entry into the research (relevance to the purpose of the research, having a structured research framework, & publication in a valid journal) for review.

### Quality assessment

The present authors evaluated all articles after extraction from the desired databases. To further improve the quality of articles, after removing articles unrelated to the research objectives and selecting the main articles, the list of sources of selected articles was searched again to increase the assurance of identifying and reviewing existing articles. Three researchers individually analyzed the content of each of the 27 articles. Each researcher studied each article separately, then entered the data related to each article into the content analysis form. The quality of articles using the PRISMA checklist, as follows: matching the structure of the article with the type of research, research purpose, the research community, sample selection process, data collection tools, data analysis using statistical tests related to the objectives specified existence of entry and exit criteria, observance of ethics in research, the presentation of findings per the objectives of the research and discussion of the findings were evaluated based on the results of related research. The quality of the articles was evaluated using the criteria provided by Gifford et al. [32]. Based on the criteria provided for quantitative (6 criteria), qualitative (11 criteria), quasi-experimental (8 criteria), and experimental (7 criteria) studies, the articles were evaluated on a two-point scale (zero and one). The cut-off point was equal to 4 and less for quantitative articles, 6 and less for experimental and quasi-experimental studies, and 8 and less for qualitative studies.

### Data extraction

Out of 394 articles related to depression, anxiety, and stress of patients with MS or epilepsy during the COVID-19 pandemic, after deleting articles that were not associated with the study's objectives, 27 related articles were finally included in the study and examined thoroughly and accurately (Figure 1).



**Figure 1.** PRISMA flow chart outlining research results

**Figure 1.** PRISMA flow chart outlining research results

## Results

In this study, 27 eligible research articles in English were reviewed. The following are the findings of a review of articles examining depression, anxiety, and stress in patients with MS and epilepsy during the COVID-19 pandemic (Table 1).

Out of 394 articles related to depression, anxiety, and stress in patients with MS and epilepsy during the COVID-19 pandemic, 27 articles were reviewed and selected with a population of 9528 based on inclusion and exclusion criteria. The systematic review also included 20 countries, as follows: Iran, China, Serbia, Turkey, Japan, Belgium, Saudi Arabia, Lithuania, Kuwait, Italy, Brazil, USA, England, Argentina, Mexico, Spain, Dominican Republic, Venezuela, Cuba, and Egypt, indicating the importance of assessing the mental health of patients

with MS and epilepsy during the COVID-19 pandemic. Of the 27 articles reviewed, 40.7% and 59.3% were published in 2020 and 2021. According to the examined studies, patients with MS and epilepsy experienced depression, anxiety, stress, fear, poor sleep quality, mental fatigue, and poor quality of life during the COVID-19 pandemic. Quarantine has limited patients' access to medication and treatment, resulting in increased seizures and disease severity. Factors such as female gender, loneliness, economic problems, lack of social support, old age, and lack of exercise also affected the severity of depressive symptoms, stress, and anxiety in patients with MS and epilepsy during the COVID-19 pandemic.

## Discussion

This study investigated depression, anxiety, and stress in patients with MS and epilepsy during the COVID-19

**Table 1.** A summary of published articles on psychological distress in patients with MS and epilepsy during the

COVID-19 Pandemic				
Authors	Purpose	Sample	Country	Results
Carotenuto et al. 2021 [5]	Physical Exercise Moderates the Effects of Disability on Depression in People with MS during COVID-19	497 MS patients	Italy	Patients with MS suffer from severe depression during the outbreak of COVID-19. Patients who exercised, or at least had a desire for physical activity, were less likely to be depressed.
Carneiro et al. 2021 [6]	Challenges faced by people with epilepsy and their caregivers during the COVID-19	50 epilepsy patients	Brazil	40% of patients had difficulty accessing good doctors. 38% also had difficulty in receiving anticonvulsant drugs. 26% of patients experienced more seizures due to anxiety and stress during the outbreak of COVID-19.
Motolese et al. 2020 [10]	The Psychological Impact of COVID-19 Pandemic on People with MS	60 MS and 50 among patients' cohabitants	Italy	Patients with MS had higher depression, anxiety, and mental fatigue rates. Also, patients' quality of sleep was significantly reduced, worsening MS patients' symptoms.
Millevert et al. 2021 [11]	Impact of COVID-19 on the lives and psychosocial well-being of persons with epilepsy	407 epilepsy patients	Italy	18.7% of patients reported a decrease in income during the epidemic. 30 to 50 percent also had difficulty preparing anticonvulsant drugs. Reported a 30% increase in seizures. 72 and 39% also had anxiety and depression. 46% of patients also sought treatment.
Donisi et al. 2021 [12]	Insights for Fostering Resilience in Young Adults with MS in the COVID-19	247 MS patients	Italy	Patients with MS had more anxiety, worry, and fear than before the COVID-19 pandemic. About 40% of patients reported increased social support and well-being as influential factors in improving their living conditions.
Yunier et al. 2021 [13]	Fear of COVID-19 predict anxiety and depression reactions in patients with MS	202 MS patients	Argentina, Mexico, Spain, Dominican Republic, Venezuela, and Cuba	Patients with MS whose treatment sessions did not go well had a lot of depression and anxiety. People's mental health also played an essential role in people's response to treatment.
Shaygannejad 2021 et al. [14]	Fear of relapse, social support, and psychological well-being of patients with MS during COVID-19	165 MS patients	Iran	There was a negative correlation between social support and fear of recurrence of patients with MS. There was also a significant positive relationship between depression, anxiety, and stress with fear of recurrence. Women also reported higher fears of recurrence during the COVID-19 outbreak than men.
Alschuler et al. 2021 [15]	Distress and risk perception in people living with MS during COVID-19	491 MS patients	USA	Patients with MS experienced great anxiety during the COVID-19 pandemic. Age, gender, and severity of the disease were among the factors associated with anxiety and depression in patients.
Stojanov et al. 2020 [16]	Psychological status of patients with MS during COVID-19	95 MS patients	Serbia	78.5% of patients were afraid of having Covid, 33.8% believed there was no cure for COVID-19, and 72.4% also had anxiety and stress because they could not go to the hospital for treatment as before.
Giordano et al. 2021 [17]	Correlates of psychological distress in epileptic patients during the COVID-19	40 epileptic patients	Italy	The role of psychological factors in the increase and severity of seizures in patients with epilepsy. Anxious women and individuals experienced more seizures during the COVID-19 outbreak.
Puteikis et al. 2021 [18]	Evaluation of the status of patients with epilepsy during the COVID-19	143 epilepsy patients	Lithuania	Seizures increase in 15.4% of patients during the COVID-19 pandemic. Also, the mental and physical health of patients with epilepsy has been severely damaged during the outbreak of COVID-19.

COVID-19 Pandemic				
Authors	Purpose	Sample	Country	Results
Alkhotani et al. 2020 [19]	effect of COVID-19 on seizure control and self-reported stress on the patient with epilepsy	156 epilepsy patients	Saudi Arabia	29.5% of patients reported an increase in seizures. 59.4% had high stress, and 71.2% reported poor sleep quality during the prevalence of COVID-19.
Van Hees et al. 2020 [20]	access to healthcare and prevalence of anxiety and depression in persons with epilepsy during COVID-19	399 epilepsy patients	Belgium	25% of patients with epilepsy had COVID-19. 19.6% of patients had difficulty obtaining their anticonvulsant drugs. 39.8% and 46.9% had anxiety and depression. Female gender and financial problems were associated with decreased mental health.
Niimi et al. 2021 [21]	Evaluation of the status of patients with epilepsy during the COVID-19	32 epilepsy patients	Japan	Patients with epilepsy who underwent surgery before the outbreak of COVID-19 had less depression and stress than those who did not. Age, gender, and severity of the disease also played a role in anxiety.
Ramezani et al. 2021 [22]	Fear and anxiety in patients with MS during COVID-19	410 MS patients	Iran	31.2% and 39.3% of patients with MS had anxiety and depression. Also, there was no significant difference between marital status, history of smoking, and medication with depression.
Gul, 2021 [23]	Depression and sexual functions in epilepsy patients during the COVID-19	116 epilepsy patients	Turkey	During the outbreak of COVID-19, the rate of depression and stress in patients with epilepsy has increased significantly. Patients' sexual function had also decreased. Drug use and seizures also increased during the outbreak of COVID-19.
Talaat et al 2020 [24]	Mental health of patients with MS during the COVID-19	115 MS, 33 MS caregivers, and 129 controls	Egypt	Patients with MS had high levels of stress, anxiety, and depression compared to caregivers and healthy individuals. Younger patients and those worried about developing COVID-19 also experienced more anxiety.
Strizović et al. 2021 [25]	Influence of COVID-19 on quality of life in patients with epilepsy	97 epilepsy patients	Serbia	An increase in seizures in patients with epilepsy. Patients with depression, anxiety, and fear of COVID-19 reported poor quality of life.
Bonavita et al 2020 [26]	Stress and social support in people with MS during COVID-19	612 MS and 674 controls	Italy	43% and 58% of patients with MS have perceived depression and stress. People who were afraid of COVID-19 also experienced high anxiety levels during the pandemic.
Costabile et al. 2021 [27]	COVID-19 pandemic and mental distress in MS	497 with MS and 348 controls	Italy	Patients with MS had higher depression, anxiety, and insomnia rates than ordinary people. The patient's attitude towards the current situation impacted mental health. Patients who were passive and identified as cognitively dysfunctional experienced high levels of depression.
Abokalawa et al. 2021 [28]	Effects of COVID-19 on people with epilepsy	151 epilepsy patients	Kuwait	55.6% of patients reported poor sleep quality. 66.2%, 77.2%, and 75.5% of patients also had depression, anxiety, and stress, respectively. Also, 23% of patients reported increased seizures during the COVID-19 pandemic.
Garjani et al. 2021 [29]	The mental health of people with MS during the COVID-19	2010 MS and 380 people without MS	England	Patients with MS had higher levels of depression and anxiety than normal people. They also had less social support during the pandemic, felt lonely, and had less exercise.

COVID-19 Pandemic				
Authors	Purpose	Sample	Country	Results
Huang et al. 2020 [30]	COVID-19 outbreak: The impact of stress on seizures in patients with epilepsy	362 epilepsy patients	China	About 9% of patients reported an increase in seizures during the outbreak of COVID-19. Patients with high stress and fear experienced higher seizure severity than COVID-19.
Asadi-Pooya et al. 2020 [33]	Impacts of the COVID-19 pandemic on Iranian patients with epilepsy	53 male and 47 female patients	Iran	Patients with epilepsy have a higher rate of depression and anxiety than before the outbreak of COVID-19. They also had trouble finding medicine, drug, and doctor.
Chiaravalloti et al. 2021 [34]	The emotional impact of the COVID-19 on individuals with progressive MS	131 MS patients	USA	The rate of depression and anxiety in patients had increased. Also, patients with lower social support and quality of life had lower mental health.
Demir et al. 2020 [35]	Neuropsychiatric changes during the COVID-19 pandemic in MS	50 MS patients	Turkey	There is an increase in anxiety, stress, and depression in patients with MS during the prevalence of COVID-19. Many patients had poor sleep quality and reported severe fear of COVID-19.
Hao et al. 2020 [36]	Severe psychological distress among patients with epilepsy during the COVID-19	252 patients and 252 controls	China	Age, marital status, education, and gender affect the stress level of patients with epilepsy. Also, people who were more anxious than COVID-19 experienced more seizures.



pandemic. The obtained results indicated that patients with MS and epilepsy experienced depression, anxiety, stress, fear, and low sleep quality during the COVID-19 pandemic and home quarantine [11, 29].

At the beginning of the COVID-19 pandemic, there was news on media and social platforms that people with chronic diseases and the elderly were more vulnerable to the virus. As a result, such people had a tough year, experiencing depression, fear, and tension. This further deteriorated their immune systems. Those with chronic diseases are more likely to be infected by COVID-19 as they have weaker immune systems [17]. Excessive anxiety and stress are harmful to health, and the individual may undergo severe heart attacks. Thus, psychological distress, along with a weak immune system, has led to a rise in the death rate of individuals with chronic diseases during the COVID-19 pandemic globally [11-13]. Moreover, according to the reports on the age and background disease effects on COVID-19 severity, individuals without chronic disease or underlying medical conditions experienced lower stress and anxiety [37].

The psychological health of MS and epilepsy patients significantly declined during the COVID-19 pandemic [10, 11]. Mental health is substantially related to MS and other chronic diseases. Patients who encounter MS and epilepsy experience a mental health decline due to the repeated pain and a poor immune system, and depres-

sion, stress, and anxiety rise as the severity of the disease and pain increase. Furthermore, experiencing excessive stress may result in attacks in MS patients [5]. Psychological syndromes have complicated relationships with MS, and their spread could respond to many factors. Indeed, physical signs, e.g., fatigue, inability, significant problems in the family, work, and social life, lead to the reoccurrence of physiological syndromes and, consequently, increase disease inflammation. Also, the neurological damages imposed by MS on the CNS could be associated with psychological and cognitive syndromes [38]. MS patients also suffer from related difficulties that prevent active participation in health-based activities (i.e., active presence in society & sports activities), leading to increased consequences and limitations in life [39].

The COVID-19 pandemic decreased the interaction of MS patients with their doctors and hospitals. Therefore, they had difficulties finding their medicines and significantly relapsed [12]. Additionally, numerous MS patients had substantial stress and fear of COVID-19, which increased their anxiety [15, 16]. Home quarantine and a distance from friends and society aggravated depression in MS patients [14]. Accordingly, the results of Costabile et al. demonstrated that MS patients experienced higher depression, anxiety, and lack of sleep than normal people during the COVID-19 pandemic. The attitude of a patient toward the current situation influences their men-

tal health. Passive patients who introduced themselves cognitively inefficient experienced high depression [27].

Epileptic patients encounter biopsychosocial conditions. Dysfunctional underlying beliefs reduce compatibility skills and the ability to deal with problems in epilepsy patients [40]. These patients were affected by COVID-19 and received lower social support. They were under home quarantine, away from their friends and society, and underwent economic losses in their incomes and jobs [18]. These mental conditions make epilepsy patients vulnerable to various psychological conditions, including stress, depression, and anxiety [21]. These psychological conditions are referred to as interictal dysphoric syndrome [11]. In the cognitive model of depression, adverse and stressful life events are the stimulators of a depressed mood. Stressful events account for most epilepsy patients' lives [20]. Epilepsy, its treatment, and permanently dealing with a neurological disorder cause substantial stress.

In many cases, the patient can live everyday life in the interval of seizures [25]. However, the problems associated with treatment side effects and the fear of losing control and name-calling impose extensive social limitations on patients. Considering unforeseeable seizures, epilepsy patients encounter stressful and disappointing situations, such as work problems and poor social interactions [19]. Stress was recognized as a large factor that significantly predicts seizure attacks in epilepsy patients. Almost two-thirds of epilepsy patients refer to stress as the largest predictor of their seizure attacks. Seizures are twice more likely to occur in patients with a higher level of anxiety than other patients [30].

Epileptic patients experienced more frequent seizures due to stress and anxiety during the COVID-19 pandemic [28]. Patients' limited access to medicine and physicians also exacerbated the disease in many people [33]. As a result, patients who receive inadequate social support from their families and friends undergo substantial depression and anxiety [34]. In this regard, Abokalawa et al. [28] indicated that 55.6% of epilepsy patients reported poor sleeping quality during the COVID-19 pandemic. Furthermore, 66.2%, 77.2%, and 75.5% of the patients had depression, anxiety, and stress, respectively, while 23% reported increased seizures during the pandemic. The Gul [23] study reported increased psychological distress in epilepsy patients. Furthermore, medicine consumption and seizure frequency significantly increased during the COVID-19 pandemic due to increased stress in patients.

A limitation of the present review study is the unavailability of the full text of some articles, which led to the non-inclusion of these articles in the review process. Moreover, two years have passed since the outbreak of COVID-19 in the world, and we are still witnessing the mutation of this deadly virus; therefore, it is necessary first to study the psychological consequences of the COVID-19 pandemic concerning neurological diseases. Considering the vaccination of many patients with MS and epilepsy worldwide, it was also studied on the long-term consequences of the outbreak of COVID-19, such as post-traumatic stress, post-traumatic stress disorder, and sexual and social relationships.

## Conclusion

The obtained findings suggested a high prevalence of depression, anxiety, stress, and fear in patients with MS and epilepsy during the COVID-19 pandemic. Mental health services were mainly available online during the pandemic; thus, MS and epilepsy patients had several problems due to limited access. In addition, many patients cannot consult a physician to receive their monthly prescriptions due to social distancing and public transportation restrictions. This leads to non-treatment and exacerbated previous psychological symptoms. Besides, social exclusion's (adverse) effects increase with hospitalization, as many hospitals located in infected areas do not allow visitors.

Moreover, depression, anxiety, stress, limited access to medication, and attending physician increased seizures in MS and epilepsy patients. Therefore, it is necessary to identify and treat psychological disorders in patients and their treatment by a psychologist. MS and epilepsy are among the most common neurological disorders; therefore, in this review study, we tried to investigate the psychological distress of these patients. The results also show an almost equal prevalence of depression, anxiety, stress, and fear of COVID-19 in patients with multiple sclerosis and epilepsy.

## Ethical Considerations

### Compliance with ethical guidelines

All study procedures were done in compliance with the ethical guidelines of the 2013 version of the Declaration of Helsinki.



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## Authors contributions

Conceptualization and Supervision: Farzin Bagheri-Sheykhangafshe; Methodology: Mina Fathi-Ashtiani and Ali Fathi-Ashtiani; Investigation: Farzin Bagheri-Sheykhangafshe and Ali Fathi-Ashtiani; Writing the original draft, review, and editing: All authors.

## Conflict of interest

The authors declared no conflicts of interest.

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