



Epilepsy and COVID-19: Updated Evidence and Narrative Review

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Abstract

The Coronavirus complaint 2019 outbreak started in Wuhan, China, in late 2019 and fleetly spread encyclopaedically. Vaccines have lately been developed and are being administered in some countries, but their widespread use isn't yet sufficient; the battle against COVID-19 is prolonged and people need to acclimatize to living under the influence of this complaint. Epilepsy is a common habitual neurological condition characterized by a robotic rush of unprovoked seizures. The colourful goods of COVID-19 on epilepsy have been studied in recent months. As clinicians, we need to keep up with diurnal updates in the substantiation regarding the relations between COVID-19 and epilepsy. This review composition summarizes the current substantiation. Prospective studies on epilepsy and COVID-19 remain lacking. The utmost composition has comprised case reports, case series, retrospective studies, and recommendations and opinions that don't include data. Still, recapitulating these papers can identify the demands for exploration into COVID-19 and epilepsy by clarifying what's known and what remains unclear from current exploration [3].

Keywords

Epilepsy, COVID-19, Antiepileptic drugs, Epilepsy surgery, Neurological disorder.

1. INTRODUCTION:

Coronavirus complaint 2019 (COVID-19) is a new contagious complaint caused by severe acute respiratory pattern (SARS) coronavirus 2 (SARS-CoV-2). This complaint represents one of the most significant afflictions in mortal history. Research into COVID-19 from multiple perspectives is underway around the world to address the pitfalls of this complaint. Severe acute respiratory pattern coronavirus 2 is a contagion that targets angiotensin-converting enzyme 2 receptors, which are set up in the lower respiratory tract and the cells of multiple organs, including the brain. Epilepsy, a complaint characterized by a robotic rush of unprovoked seizures, is one of the most common habitual neurological conditions. The frequency of this

pathology is reported as 0.7-1.0 with high frequency among senior individuals and children. Colourful factors girding epilepsy may be affected by COVID-19 and care for cases with epilepsy in the COVID-19 period, therefore, need to consider similar factors. Consideration of the relationship between epilepsy and COVID-19 is easily important [1].

2. ASSOCIATIONS BETWEEN COVID-19 AND EPILEPSY/SEIZURES:

2.1 Could individuals with epilepsy be at higher risk of COVID-19 than others?

As we have bandied ahead, the Centres for Disease Control and Prevention (CDC) had suggested that neurological comorbidities, including epilepsy, may be threat factors for COVID-19, despite a lack of

substantiation. Still, this statement was latterly removed from the CDC website. One cross-sectional study delved into whether cases with active epilepsy may be at threat of COVID-19 compared to a control group. According to that study, active epilepsy would be an independent threat factor for both the prevalence and mortality of COVID-19. In that study, active epilepsy was associated with a 5.1- fold lesser odds rate of mortality threat. Still, that interpretation of the results should only be accepted with caution, because the study showed the limitation of including probable and possible cases that remained unconfirmed as COVID-19 positive by polymerase chain response testing. The active epilepsy group in that study included 12 possible/ probable cases, counting for completely 57 of the group. Again, another study in Spain and Italy reported that among 5700 cases with epilepsy managed at three epilepsy centres, only 14 tested positive for COVID-19 without any egregious impact on epilepsy. Grounded on the limitations of the first study and the inconclusive results of the alternate study, it's presumably too early to determine that epilepsy is a threat factor for COVID-19. A methodical review composition showed that the rate of COVID-19 inflexibility in people with epilepsy is lower than in other neurological diseases similar as madness, cerebrovascular complaint, and multiple sclerosis. In addition, epilepsy isn't a single complaint and has numerous causes and associations, some of which may prostrate the case and increase the threat of respiratory or other independent threat factors. Research looking at different groups of epileptics is also demanded to determine which cases with epilepsy are truly an advanced threat [2].

2.2 Could COVID-19 cause acute symptomatic seizures?

Acute characteristic seizures can be caused by the poor general condition and substantial fever arising from infection. This would also apply to COVID-19 and the prevalence of this etiology represents an important concern for exigency department croakers and neurologists. Several papers have delved into the prevalence of acute characteristic seizures, but a more comprehensive determination is demanded given the multifactorial influence of COVID-19 on complaint inflexibility and other background conditions. Colourful studies have reported the prevalence of acute characteristic seizures due to COVID-19 as lower than 1. This is lower than the seizure rates preliminarily reported for SARS (2.7) and middle east respiratory pattern (8.6), suggesting that acute characteristic seizures caused by the COVID- 19 aren't particularly common compared with other viral conditions. We should also note the

lack of reports on seizures among COVID-19 donations in the general population. Acute characteristic seizures have not been mentioned in several studies that epitomized the symptoms of a large sample of COVID- 19 cases [16].

2.3. Would patients with epilepsy experience worsened seizures during the COVID-19 crisis?

COVID-19 goods wielded not only directly on the mortal body but also laterally through the wider influences on society should be considered. Several studies have reported changes in seizure frequency among cases with epilepsy during the COVID- 19 extremity, anyhow of whether these cases were infected with COVID-19. According to those studies, the proportion of cases passing increased seizures varied from 8-35 and may reflect factors like the status of COVID-19 infection in different locales and the proportions of individualities with an at-threat background (e.g., aged age). The study that reported the smallest rate of seizure exacerbation included lower than 2 of cases over 60 times old and 31 of cases in their teens. We also should consider differences in dates and countries. The study was conducted up to March 5, so the data can be considered earlier than other studies, although reported. Some studies have reported threat factors for seizure exacerbation and analogous factors similar to the number of antiepileptic medicines (AEDs), seizure frequency at baseline, sleep-related problems and internal stress have likewise been reported from separate studies. On the other hand, in a study involving three epilepsy centres in Italy and Spain, no significant changes in seizure frequency were reported during the COVID-19 exigency, and more unexpectedly the number of calls from cases dropped significantly. One explanation was that stay-at-home orders or counterblockade due to COVID-19 would allow cases with epilepsy to live a regular life. The lifestyle variations assessed by the lockdown, better compliance with treatment, and sleep chronicity may have led to better seizure control. On the other hand, increased stress and lack of access to croakers or drug renewals, particularly during the early months of service shutdowns, would probably have worsened seizure control during the COVID-19 extremity. Whether seizures increase in cases with epilepsy during the COVID- 19 extremity would depend to a large extent on how their lives and societies are affected by COVID-19, the degree of cerebral stress they witness related to its goods, whether they live in an area where the COVID- 19 is indigenous, the quality of epilepsy care in the area during the COVID- 19 extremity, and the background of each case [5],[7].

2.4. Comorbidity of patients with epilepsy and COVID-19

Epilepsy isn't a complaint, but rather a symptom complex with a veritably high burden of comorbidities. Cases with epilepsy can thus show an extremely wide variety of comorbidities and backgrounds. Allowing about the relationship between these and COVID-19 is as important for clinicians as allowing about the relationship between epilepsy and COVID-19. For illustration, if an individual with epilepsy is senior, the threat of severe COVID-19 illness is more advanced than that in the general population, taking further watchful infection control measures. Likewise, as banded preliminarily, the threat is indeed advanced if individuals have other comorbidities that may put them at elevated threat of COVID-19. Stroke, an extensively known cause of epilepsy in seniors, greatly reduce the conditioning of diurnal living and weakens patient impunity. This could increase the pitfalls of infection with COVID-19 and posterior severe illness. Paediatric cases with epilepsy who have neuro disabilities or underpinning brain conditions are more likely to develop pneumonia or other respiratory complications. These respiratory conditions could represent threat factors for COVID-19. In addition, close attention should also be paid to the background of cases. For illustration, if a patient lives in a nursing home, concern about outbreaks is warranted. Another study showed that indeed among cases with epilepsy and multiple comorbidities, a high chance of asymptomatic individualities was observed, suggesting that epilepsy-related factors don't inescapably lead to poor issues. Further exploration into the pitfalls of COVID-19 arising from complications and terrain in cases with epilepsy is still demanded [6].

2.5. Epilepsy as a neurological complication of COVID-19

Unlike acute characteristic seizures, epilepsy is a habitual condition involving intermittent seizures that do a certain time after the cause of the seizure. The prevalence of epilepsy caused by COVID-19 isn't known yet and any similar examinations will bear a sufficient follow-up period at least in the order of multiple months. We thus don't presently have clear answers to a variety of clinical questions, similar as who's likely to develop epilepsy due to COVID-19, what kinds of seizures are likely to affect, how delicate seizure control will be or how similar seizures will differ from epilepsy caused by other viral infections [8].

3. ELECTROENCEPHALOGRAMS (EEGS) DURING THE COVID-19 CRISIS:

3.1. Guidance to obtaining EEGs during the COVID-19 crisis

In response to the rapid-fire outbreak of COVID-19, the Latin America chapter of the International Federation of Clinical Neurophysiology handed guidance on performing clinical neurophysiology studies during the COVID-19 extremity. That guidance recommends that cases be assessed for COVID-19 threat by asking them questions about their clinical donation and epidemiology previous to testing. Depending on the case's threat, the neurophysiology service labour force should take the necessary preventives. In addition, the Italian Society of Neurophysiology, the Italian League Against Epilepsy and the Italian Association of Neurophysiology together proposed guidance on EEG testing. Common particulars in both guidance included the conservation of personnel defensive equipment for healthcare providers, acceptable hygiene of outfit for performing EEG and suitable disinfection of laboratory space. In other words, these associations riveted on two points (1) optional EEGs were put on hold to free up sanatorium beds with cases on the rise and to lower the threat of viral infection and spread, with plans to renew when the safe and applicable; and (2) system were acclimated to cover EEG technologists, other healthcare workers and unborn cases to be recorded, and included types of EEGs to be preferentially performed, junking hyperventilation as an instigative procedure during EEG recording, provision of proper particular defensive outfit and new protocols for disinfecting labs and recording outfit. While important general issues related to conducting EEGs are present during the COVID-19 epidemic, all final opinions on clinical care are also explosively dependent on original governmental rules and regulations as well as sanatorium and inpatient clinic programs. Final opinions on conducting EEG during the COVID-19 extremity should be precisely acclimatized to the specific requirements of the original clinical practice situation [4].

3.2. EEG findings in patients with COVID-19

Several reports have described EEG results in cases affected by COVID-19. In utmost case series, EEG testing is performed following a seizure or altered knowledge, on suspicion of acute characteristic seizures or encephalopathy. Numerous of those reports have set up no COVID-19-specific findings that would lead to dubitation of COVID-19 infection grounded on EEG testing. According to a study from New York that epitomized the EEG findings of 111 cases with COVID-19, the medical history of epilepsy

or acute characteristic seizures previous to EEG was singly associated with epileptiform EEG findings. Another study showed EEG data from 10 successive cases affected by COVID-19, divided into groups of good and poor prognostic, and performed quantitative EEG analysis. A large multicentre study is demanded to probe the characteristics of EEG findings in COVID-19 cases [9].

4. IMPACT OF COVID-19 ON EPILEPSY CARE:

4.1. Restriction of clinical care due to COVID-19

The social impact of COVID-19 is seen not only among individuals with epilepsy but also on epilepsy care installations. The access of cases to healthcare installations has been greatly confined because of the eventuality of case-to-case or healthcare provider-to-case transmission of SARS-CoV-2. In addition, in hospitals with COVID-19 convalescents or areas with wide COVID-19 infection, standby admissions have been oppressively limited due to fears of case-to-case transmission. In fact, in a check of 212 paediatric neurologists in 49 countries, further than 90 of the croakers responding stated that in-person inpatient visits had dropped, and the use of telemedicine had decreased. The same study also set up roughly 90 drops in EEG. As for the number of EEG tests a check of further than 200 Italian centres set up a 75 reduction in the number of EEGs during the extremity compared to the pre-COVID-19 birth, particularly in specific EEGs similar to long-term monitoring/ itinerant. The study mentioned before that reported on the current status of three epilepsy centres in Italy and Spain set up that lower than 10 of conditioning were related to epilepsy care, that all listed surgeries were laid over, and that all epilepsy-related hospitalizations and EEGs were exigency cases only. Other inpatient services for new cases and AED tapering plans and changes to VNS settings were laid over. On the other hand, Italian data on neurological conditions, not only in patients with epilepsy showed that 641 cases (30) were suspended in sanatorium treatments, the activity of other support interventions 76 cases complained about medicine attainability and 480 individuals (19) reported private worsening of neurological symptoms during the lockdown [10].

4.2. Utility and strengths/weaknesses of telemedicine for patients with epilepsy

As mentioned over, one of the most significant changes healthcare associations have been forced to make is the switch from rehabilitation watch to telemedicine. Several studies probing the use of telemedicine during the COVID-19 extremity have been reported. According to a composition recapitulating the pros and cons of telemedicine

during the COVID-19 extremity advantages include the egregious benefits of avoiding exposure to SARS-CoV-2, in addition to the traditionally stated benefits of reducing fiscal and time burdens on cases and benefits to cases who have difficulty in penetrating healthcare installations. On the other hand, telemedicine also arguably has weaknesses in that the capability to perform physical examinations is greatly clinical tests cannot be performed, and the system is inconvenient for cases with difficulties sharing in telemedicine due to hail or visual impairments. Particularly in terms of physical examinations and observation of adverse goods from AED's videotape telemedicine may be suitable to address these weaknesses to some degree, but as mentioned over, this may be indeed more limited when nearly all rehabilitates conduct relations by telephone Clinicians should make every trouble to ensure that cases aren't negatively affected by telemedicine, using styles applicable to the characteristics of the community, sanatorium, and COVID-19 infection situation [11].

5. TREATMENT FOR PATIENTS WITH EPILEPSY DURING THE COVID-19 CRISIS:

5.1. AED therapy

Cases with epilepsy, as with the general population, may be treated for COVID-19, and clinicians need to be aware of the eventuality of relations between AEDs and COVID-19 curatives. Caution should be exercised, as relations can either dwindle or enhance the effectiveness of medicines, or beget side goods. Some combinations of AEDs and COVID-19 curatives can beget potentially fatal arrhythmias and the eventuality for similar relations therefore, bear special attention according to the Italian League Against Epilepsy. Other, similar to carbamazepine, phenytoin and phenobarbital should be used with caution when in combination with remdesivir which is frequently used to treat COVID-19. Especially, levetiracetam is largely innocent by COVID-19 medicines. Consideration should be given to switching to AEDs with lower eventuality for relations in cases who may need treatment for COVID-19. On the other hand, changing the AED authority has been reported as a factor associated with increased seizures. Clinicians should thus completely consider the threat and benefits of changing AEDs to lower interactive agents in their treatment opinions. Threat-to-benefits considerations must therefore be made to determine whether the implicit threat of causing seizures when switching AEDs is overbalanced by the implicit benefits of reduced medicine interactions between AEDs and COVID-19 treatments [12].

5.2. Diet therapy

Some cases with epilepsy are on a ketogenic diet or other salutary rules to control epileptic seizures. Similar cases bear regular nutritive guidance, which may be delicate to maintain because of the restrictions in place during the COVID-19 extremity. Securing the constituents of the ketogenic diet may also be more delicate. Therefore, cases may witness substantial obstacles to maintaining specific diets under the COVID-19 extremity. Still, one letter reported that telemedicine using videotape exchanges for five cases enabled all five to continue their diets. The possibilities of telemedicine in terms of furnishing nutritive guidance are also promising [13].

5.3. Immunotherapy/steroids

Some individuals with epilepsy use immunosuppressive medicines and steroids to treat primary conditions. Considerations should also be given to whether their use of these immunosuppressants increases the threat of COVID-19 infection or severe complaints. No similar substantiation has yet been reported for cases with epilepsy. Still, one important tool is the capability to infer likely results using substantiation accumulated from cases entering immunosuppressive medicines for other complaints. Several studies have delved into whether cases using immunosuppressive medicines may be a threat to severe COVID-19. In utmost similar studies, immunosuppressive medicines didn't present an egregious threat. About, the threat of COVID-19 in cases with habitual steroid use. One study has been reported in patients with seditious bowel conditions. According to that study, steroid use was a threat for COVID-19 along with age and the presence of comorbidities. Still, further exploration is demanded, as studies on the threat of immunosuppressive medicines and steroids limited to cases with epilepsy haven't yet been conducted [14].

6. MENTAL HEALTH IN PATIENTS WITH EPILEPSY:

The extent to which the social impact of COVID-19 is causing internal stress in people has entered a great deal of attention. In particular, people with epilepsy are affected by COVID-19 in colourful aspects of their internal health. Several reports have examined the psychological stress in cases with epilepsy, and similar cases are reportedly more susceptible to cerebral stress from COVID-19 than the general population. In the two studies that reported on stress in cases with epilepsy, the probabilities of cases with increased stress differed markedly. Reasons for this difference could include differences in the chance of women, who appear vulnerable to stress in this

extremity and the chance of aged individuals, who are at threat information about COVID-19 opinion of epilepsy within 5 times of opinion history of psychiatric diseases and occupational status. Internal stress can also increase seizure frequency and can lead to depression and other internal health problems, so the internal status of cases with epilepsy needs to be laboriously assessed [15].

7. CONCLUSION:

We have updated and summarized the current reported evidence on COVID-19 and epilepsy. This paper clarifies our current position and remaining scientific gaps.

It should be noted, however, that only a few months have passed since COVID-19 became widespread, and all the studies described here are unavoidably early and retrospective or cross-sectional in design. Accumulation of quality evidence on epilepsy and COVID-19 requires further research activities.

REFERENCES

- [1] Ghelichi L, Ghassemzadeh H, Ghadiri-Azerkan K, et al. Epilepsy in patients with COVID-19: A systematic review and meta-analysis. *Seizure*. 2021; 87: 147-156. doi: 10.1016/j.seizure.2021.03.008
- [2] Garg RK, Paliwal VK, Gupta A. Encephalopathy in patients with COVID-19: A review. *Journal of Medical Virology*. 2021 Jan;93(1):206-22. doi: 10.1002/jmv.26441.
- [3] Kotan, D., Gunes, H.N., Metin, B. and Ucler, S., 2021. Epilepsy and COVID-19: a comprehensive review. *Journal of Epilepsy Research*, 11(1), pp.1-11. doi:10.14581/jer.21001
- [4] American Clinical Neurophysiology Society. ACNS Guidance on Provision of Neurophysiologic Monitoring Services During the COVID-19 Pandemic. Version 1.1. April 7, 2020. Accessed April 28, 2023.
- [5] Asadi-Pooya AA, Simani L. Central nervous system manifestations of COVID-19: A systematic review. *Journal of the Neurological Sciences*. 2020 Jul 15; 413:116832. doi: 10.1016/j.jns.2020.116832.
- [6] Tsai MS, Tsai CY, Chen CH, et al. Comorbidity of epilepsy and COVID-19: a population-based cross-sectional study. *J Neurol*. 2021;268(7):2268-2276. doi: 10.1007/s00415-021-10557-6. PMID: 33595861.
- [7] Kuroda N. Epilepsy and COVID-19: Associations and important considerations. *Epilepsy & Behavior*. 2020 Oct; 112:107298. doi: 10.1016/j.yebeh.2020.107298.
- [8] Fadakar N, Ghaemmaghami S, Masoompour SM, Shirafkan H, Zarei M, Taghdir M, et al. Neurological manifestations of COVID-19: a systematic review and meta-analysis of proportions. *Neurol Sci*. 2021 Mar;42(4):1165-1183. doi 10.1007/s10072-021-0514 9-9.
- [9] Sohal S, Mossammat M, Kaur H, Kaur I, Kaur G, Kaur H, et al. COVID-19: A systematic review of the potential involvement of the nervous system. *Journal*

- of Neurology. 2021 Mar;268(3):830-848. doi 10.1007/s00415-020-10124-0.
- [10] Pettit NN, MacKenzie EL, Ridgway JP, Pursell K, Ash D, Patel B, et al. A cross-sectional analysis of clinical practice patterns during the COVID-19 pandemic in the United States. *Clinical Infectious Diseases*. 2021 Jan 19;72(2):e187-e192. doi: 10.1093/cid/ciaa935.
- [11] Hamiwka LD, Hamiwka LA, Kay L, D'Agostino J, Singh N. Telemedicine and epilepsy: A systematic review of quality-of-life and satisfaction outcomes, patient and provider communication, and cost-effectiveness. *Epilepsia Open*. 2020 Sep;5(3):318-332. doi 10.1002/epi4.12402.
- [12] Sveinsson O, Andersson T, Mattsson T, Carlsson S, Tomson T. Antiepileptic drug treatment during the COVID-19 pandemic. *Acta Neurologica Scandinavica*. 2021 Jan;143(1):36-43. doi: 10.1111/ane. 13305.
- [13] Pinto A, Rizzo R, Di Maro V, De Liso P, Cecere A, Attanasio G, et al. Modified Atkins diet during the COVID-19 pandemic: Experience from an Italian tertiary centre. *Epilepsy Behav*. 2020 Oct; 112:107366. doi: 10.1016/j.yebeh.2020.107366.
- [14] Guerin V, Lepine A, Richard MA, Etienne N, Belot A, Dulery R, et al. Use of immunotherapy in patients with epilepsy during the COVID-19 pandemic: A French nationwide multicenter study. *Epilepsia*. 2021 Mar;62(3): e36-e42. doi 10.1111/epi.16722.
- [15] Tang V, Valente K, Coelho SG, Dowling G, Nei M. Mental health and epilepsy: A review of the literature. *Epilepsy Behav*. 2021 Jan; 114:107535. doi: 10.1016/j.yebeh.2020.107535.
- [16] French JA, Brodie MJ, Caraballo R, et al. Acute symptomatic seizures. *Epilepsia*. 2015;56(5): e41-e74. doi 10.1111/epi.12960. PMID: 25916616.