

INTRODUCTION

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic, causing coronavirus disease 2019 (COVID-19), has affected 603,711,760 people worldwide [1]. It was observed that it affected not only the respiratory system, but also all systems, including the nervous system. Neurological complications are rare in children suffering from COVID-19 compared to adults (2). Neurologic manifestations include stroke, impaired consciousness, skeletal muscle injury, anosmia or dysgeusia, headache, dizziness, and seizures (3). Two cell membrane proteins are the major targets necessary for SARS-CoV-2 invasion: angiotensin-converting enzyme 2 (ACE2) receptor, and transmembrane serine protease 2 (TMPRSS2). Direct infection of the nervous system and its vasculature may be the cause of neurological symptoms because both proteins are expressed in the nervous system. Inflammatory responses secondary to local and/or systemic infection may also be the cause of neurologic involvement (4).

OBJECTIVE

The purpose of the current study was to collect data on the occurrence of seizures in children with COVID-19 and to clarify the circumstances of the occurrence of seizures in these patients.

MATERIAL AND METHODS

Fifteen children were included in the study who were referred to the Medical Faculty of Akdeniz University, Department of Pediatric Neurology, and had confirmed Covid-19 infection by PCR tests and seizure. Children presented with status epilepticus(SE), and increased frequency of an epileptic seizures, new-onset epileptic seizures and febrile seizures. The demographical, clinical and laboratory tests were re-evaluated from the hospital records retrospectively

RESULTS

Eight (53.3 %) of them had been following the diagnosis of epilepsy. Three of the patients with the diagnosis of epilepsy were admitted to the pediatric intensive care unit with status epilepticus. One of the patients had discontinued antiepileptic treatment but seizure recurrence was observed during COVID-19 infection. Seven patients experienced seizures for the first time. Two (28.7%) of them had febrile status epilepticus. All patients had fever at baseline. While seizures were observed on the 1st day of covid positivity in 13 patients. 12 patients' laboratory tests were available. C-reactive protein (CRP), procalcitonin, Neutrophil to lymphocyte ratio (NLR), platelet-lymphocyte ratio (PLR) were evaluated as inflammation markers. CRP was positive in 7 patients and 4 of these patients were in status. 5 of 9 patients whose procalcitonin value was studied, were positive. Two of the patients with abnormal EEG findings, experienced seizures for the first time. One of them had an abnormal MRI, compatible with hypoxic-ischemic injury; cytomegalovirus was detected in the cerebrospinal fluid concurrently in the other one. In follow-up, one patient who had fever-triggered new-onset seizure activity, died due to his primary disease.

Laboratuary findings	(Mean ± SD)
White blood cell (×109/L)	9,6 ± 4,4
Lymphocyte (×109/L)	2,9 ± 3,3
Polymorphonuclear leucocyte (×109/L)	5,8 ± 2,6
Platelets (×109/L)	285,6 ± 144,03
NLR	7,89± 12,15
PLR	243± 176,1
CRP, mg/L	29± 59,6
Procalcitonin, µg/L	0,73± 1,16

Characteristic	Pediatric patients
Mean age ± SD (years)	6.9 ± 6.1
Sex (M/F)	
Male (%)	11 (73.3%)
Female (%)	4 (26.6 %)
Pre-existing comorbidity (n,%)	
Epilepsy	8 (53.3%)
Other CNS problem	1 (6,6 %)
Paroxysmal nocturnal hemoglobinuria (PNH)	1 (6,6 %)
None	5 (33,3 %)
EEG (n=9)	
Normal	5
Abnormal	4
MRI (n=9)	
Normal	7
Abnormal	2

CONCLUSION

Seizure is one of the symptoms of COVID-19 in pediatric ages and may even be the first symptom. In children, severe COVID-19 is rare compared to adults. It is known that proinflammatory cytokines cause neuronal hyperexcitation. Cytokine-storm in the brain is the most important reason for new-onset seizure or seizures in patients previously diagnosed with epilepsy.

REFERENCES

1. <https://covid19.who.int/table> (11 th September 2022)
2. Panda PK, Sharawat IK, Panda P, Natarajan V, Bhakat R, Dawman L. Neurological Complications of SARS-CoV-2 Infection in Children: A Systematic Review and Meta-Analysis. *J Trop Pediatr*. 021Jul2;67(3):fmaa070.doi:10.1093/tropej/fmaa070.PMID: 32910826; PMCID: PMC7499728.
3. Chen, W, Toprani, S, Werbaneth, K, et al. Status epilepticus and other EEG findings in patients with COVID-19: a case series. *Seizure*. 2020; 81: 198-200.doi:10.1016/j.seizure.2020.08.022
4. Lin, J., Asfour, A., Sewell, T. B., Hooe, B., Pryce, P., Earley, C., Geneslaw, A. S. (2020). Neurological Issues in Children with COVID-19. *Neuroscience Letters*, 135567.doi:10.1016/j.neulet.2020.135567

ACKNOWLEDGEMENTS

‘Author Ozlem Yayıcı Koken was supported by an MRC strategic award to establish an International Centre for Genomic Medicine in Neuromuscular Diseases (ICGNMD) MR/S005021/1’