Febrile Seizures in Children with COVID-19 According to COVID-19 Variant Periods

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INTRODUCTION

Febrile seizures (FS) are the most common acute symptomatic seizures in infants AND young children. (1) Although different epidemiological studies have used the age limits of 1 month or 3 months as the lower age limit for FS, no specific upper age limit has been defined. Onset of the disease after the age of 5 years is rare (3). Studies conducted in various countries, including South Africa, Japan, South Korea, and Europe, have shown that the age cut-off for febrile seizures has changed during the COVID-19 period, with a higher incidence of seizures in children aged <6 months and >5 years (4-6).

The COVID-19 pandemic, which lasted from March 2020 to May 2023, had effects beyond the respiratory system and could affect different systems or organs. COVID-19 had a significant impact on paediatric patients, where neurological involvement and associated symptoms and complications were common. In addition to the wild-type virus, alpha, delta and omicron variants were identified during this period. It was observed that these variants caused an increase in neurological symptoms by affecting different systems and organs in paediatric patients. When neurological symptoms are analysed, febrile seizures stand out among the variable symptoms. During certain variable periods of the pandemic, the frequency of febrile seizures increased significantly in paediatric patients (7).

OBJECTİVES

The aim of this study was to investigate the characteristics of patients with febrile seizures during the variable periods of COVID-19. We also investigated the long-term effects of COVID-19 infection on the development of epilepsy, focusing on different variants.

METHODS:

A total of 730 patients with FS were divided into the COVID-19 positive group (wild, alpha, delta, omicron variant) and the COVID-19 negative group (control group).

RESULTS

1. Characteristics of COVID-19 positive & negative patients

	COVID-19 (+) PATIENTS (N:132)	COVID-19 (-) PATIENTS (N:570)	P VALUE
AGE AT PRESENTATION (MONTH)	34,22 months ± 14,9 (3-168 months)	14,6±2,69 months (4-70 months)	P<0,001
MALE FEMALE	72 (%54,6) 60(%45,4)	265 (%46,5) 305 (%53,5)	P=0,840
WBC*	3325±465,02 103/uL	11150,35±356,99 103/uL	P<0,001
LY*	1675±228,25 103/uL	4500,62±258,35 103/uL	P<0,001
NE*	837,5±357,3 103/uL	4500±355,35 103/uL	P=0,367
MO*	562,5±298,3 103/uL	950±10,85 103/uL	P=0,712
SODIUM	134 mmol/L	138 mmol/L	P<0,001
CRANIAL MRI DELAYED MYELINATION, N (%)	6 (%4,5)	23(%5,05)	P=0,673

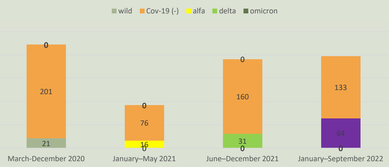

Figure 1: Compares Febrile Seizures in COVID-19 positive and negative patients during different COVID-19 variant periods.

2. Evaluation of patients by COVID-19 variant duration

	WILD (N:21)	ALFA (N:16)	DELTA (N:31)	OMICRON (N:64)	P VALUE
AGE AT PRESENTATION (MONTH)	20,8±10,3 (Min:6-Max:72)	44,1±3,39 (Min:11-Max:67)	37,8±19,9 (Min:5-Max:76)	34,2±7,9 (Min:3-Max:168)	P=0,005
AGE AT PRESENTATION (<6 MONTH)	none	none	4	10	P<0,001
AGE AT PRESENTATION (>60 MONTH)	none	none	2	10	P<0,001
MALE FEMALE	11 10	9 7	13 18	33 31	P=0.960
WBC (103/UL)	4200,25 ±458,31	2300,12 ±388,44	5200,44 ±525,93	1600,75 ±258,61	P=0.543
LY (103/UL)	1350,71 ±316,12	1900,15 ±248,82	800,32 ±223,11	950,79 ±458,32	P=0.645
NE (103/UL)	1200 ±208,02	800 ±158,82	650 ±350,21	700 ±268,88	P=0.813
MO (103/UL)	350 ±35,17	600 ±69,85	550 ±56,44	650 ±44,51	P=0.621
SODIUM (MMOL/L)	133,5	136	135,5	133	P<0,001
CRANIAL MRI DELAYED MYELINATION,	2	1	0	3	P=0.435

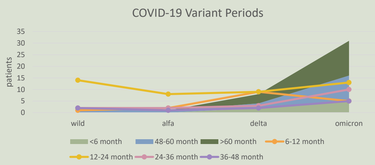

Figure 2: Age distribution of patients with COVID-19 positive febrile seizures according to variant periods.

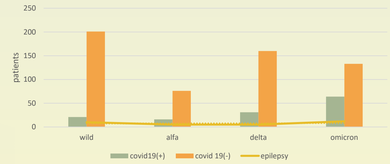

Figure 3: A comparison of patients with COVID-19 positive and negative febrile seizures in terms of epilepsy development during long-term follow-up periods of COVID-19 variants.

CONCLUSION

Febrile seizures appear to be more common in COVID-19 patients during the Omicron variant period. Our study found that hyponatremia is a risk factor for febrile seizures in patients over 48 months of age, both in the wild period and the Omicron variant period. Although our study revealed a significant association between low sodium levels and age, the pathogenesis of febrile seizures in patients remains unclear. In a long-term follow-up study of patients with febrile seizures, the development of epilepsy was not found to be correlated with COVID-19 infection.

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