



# Retrospective investigation of children presented with febrile convulsion

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## Abstract

**Aim:** In this study, we aimed to determine the characteristics of patients admitted with the diagnosis of febrile convulsion (FC) and to evaluate the most common diagnosis and the most frequent months of presentation.

**Materials and Methods:** A total of 172 children who were admitted to the pediatric emergency unit in the last one year due to FC and were admitted for observation were included in the study. The age range of the children included in the study was 5 months - 6 years (72 months). Patients were analyzed in terms of age, gender, diagnosis at presentation, type of FC, month of presentation, whether brain tomography was performed, sodium level, CRP level, white blood cell (WBC) count, and glucose level. SPSS (Statistical Package for Social Sciences) for Windows 22.0 program was used for statistical analysis.

**Results:** The median age of the patients was 20 (11-34) months and 58.7% were male. Upper respiratory tract infections were the most common cause of convulsions with 72.7%. Acute gastroenteritis followed with 20.9%. Simple febrile convulsion was present in 89.5% of cases. Brain tomography was required in 33.1% of the patients admitted due to FC. The most common month of presentation was November with 16.3%. Mean WBC level was  $13.4 \pm 6.0$  ( $\times 10^3/\mu\text{L}$ ), mean CRP level was  $24.2 \pm 35.3$  (mg/L), mean Glucose level was  $117 \pm 29.8$  (mg/dL), mean Sodium level was  $137 \pm 13.9$  (mmol/L).

**Conclusion:** In the management of this condition, which is uncomplicated and has no long-term effects in most patients, it is important to avoid unnecessary examinations and to provide accurate information to families.



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## Introduction

Febrile convulsions (FC) are the most common type of convulsion in childhood. It is triggered by a rapid rise in body temperature and may cause the child to show symptoms such as sudden and severe muscle twitching, tremors or loss of consciousness. FC is frequently observed between the ages of 6 months and 5 years [1]. Although these convulsions are often frightening, they are usually harmless and do not cause long-term health problems in children. The family of a child who has had FC for the first time thinks that their child will die. Therefore, they may be in expectation of treatment in case of an episode [2].

The frequency of FC is between 2-10%. FC is divided into two according to the duration and type of seizure. Simple FC: It lasts less than 15 minutes, does not recur within 24 hours and generalized seizures without postictal neurological deficit. Complicated FC: Lasting longer than 15

minutes, not renewed within 24 hours (2 or more), usually focal seizures [3,4].

The aim of this study was to determine the characteristics of patients admitted to the pediatric emergency department of Mardin province in the Southeastern Anatolia Region of Turkey due to FC and to evaluate the most common diagnosis and the most common months of admission.

## Materials and Methods

This study is a retrospective study. A total of 172 children admitted to Mardin Training and Research Hospital Emergency Department between 2022 and 2023 due to FC and hospitalized for observation were included in the study. Patients with a diagnosis of epilepsy and seizures without fever were not included in the study. The age range of the children included in the study was 5 months to 6 years. Patients were analyzed in terms of age, gender, admission diagnosis, type of FC, month of admission,

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whether brain tomography was performed, sodium level, C Reactive Protein (CRP) level, white blood cell (WBC) and glucose level.

Approval for the study was obtained from Mardin Artuklu University Non-Interventional Research Ethics Committee (Date: 07.05.2024, Decision no: 2024/5-20). The study was conducted in accordance with the Declaration of Helsinki.

### Statistical analysis

Descriptive statistics were used for data analysis. Continuous variables with normal distribution were presented as mean  $\pm$  standard deviation (SD). The normality of these variables was assessed using the Shapiro-Wilk test. Continuous variables that did not follow a normal distribution (e.g., age) were reported as median and interquartile range (Q1-Q3). Categorical variables were expressed as frequencies and percentages (n, %).

### Results

The data in Table 1 show the characteristics of patients admitted with febrile convulsions. A total of 172 patients were analyzed. The median age of the patients was 20 months, with an interquartile range of 11 to 34 months. Regarding gender distribution, 41.3% of the patients were male and 58.7% were female. According to the

**Table 1.** Characteristics of patients admitted with febrile convulsions.

		Patients n:172
Age (months), min-max		20 (7-70)
Gender, n(%)	Male	71(41.3)
	Female	101(58.7)
Type of febrile convulsion, n(%)	Simple febrile convulsion	154(89.5)
	Complicated febrile convulsion	18(10.5)
Diagnosis at presentation, n(%)	Upper respiratory tract infection	125(72.7)
	Lower respiratory tract infection	9(5.2)
	Acute gastroenteritis	36(20.9)
	Urinary tract infection	2(1.2)
Month of presentation, n(%)	January	12(7)
	February	9(5.2)
	March	6(3.5)
	April	11(6.4)
	May	20(11.6)
	June	18(10.5)
	July	18(10.5)
	August	19(11)
	September	13(7.6)
	October	3(2.9)
	November	28(16.3)
	December	13(7.6)
Computed tomography, n(%)	Yes	57(33.1)
	No	115(66.9)

**Table 2.** Blood values of the patients at admission.

	Patients n:172 Mean $\pm$ SD
White Blood Cell	13.4 $\pm$ 6.0
C Reactive Protein	24.2 $\pm$ 35.3
Glucose	117 $\pm$ 29.8
Sodium	137 $\pm$ 13.9

type of febrile convulsion, 89.5% of the patients had simple febrile convulsions, while 10.5% had complicated febrile convulsions. When the admission diagnoses were analyzed, 72.7% of the patients had upper respiratory tract infection (URTI) 20.9% had acute gastroenteritis, 5.2% had lower respiratory tract infection and 1.2% had urinary tract infection.

When the distribution of the month of admission was analyzed, it was observed that the most common admission was in May with 11.6%. The proportion of patients who underwent computed tomography (CT) was 33.1%, while the proportion of patients who did not undergo CT was 66.9%. These findings show the demographic characteristics of patients presenting with febrile convulsions, types of febrile convulsions, presenting diagnoses and presentation times. In particular, the ratios between simple and complicated febrile convulsions, the distribution of presenting diagnoses and presentation times provide important clinical information.

Table 2 shows the blood values of the patients at the time of admission. The mean WBC count was  $13.4 \pm 6.0 \times 10^3/\mu\text{L}$ , C reactive protein value was  $24.2 \pm 35.3 \text{ mg/dL}$ , glucose value was  $117 \pm 29.8 \text{ mg/dL}$  and sodium value was  $137 \pm 13.9 \text{ mmol/L}$ . No electrolyte disturbances or hypoglycaemia were observed.

### Discussion

Febrile convulsion is the most common neurologic problem in childhood and is the most common type of convulsions. Although FC frequently has a favorable prognosis, they are of great importance because of their recurrence and consequences such as causing afebrile seizures [5]. FC is observed more frequently in boys. In a study conducted by Okumura et al. on 203 patients, the male rate was found to be higher [6]. In a study conducted in Korea, a higher rate was observed in males [7]. In our study, it was observed more frequently in males with a rate of 58.7% in accordance with the literature.

In the study by Okumura et al. the age range for FC was 7-69 months with a median of 25 months, while in the study by Ling the age range was 1-77 months with a median age of 19.8 months [6,8]. In our study, the age range was found to be 7-70 months with a median age of 20 months and it was found to be compatible with the literature.

In patients with FC, fever usually occurs due to viral infection. In a study by Shinnar et al. the most common cause was found to be URTI [4]. In a study conducted in India, the most common cause was found to be URTI with a rate of 65% [9]. In a study conducted in our country, the most common cause was found to be URTI with a rate of 75.8%

[10]. In our study, the most common cause was URTI with a rate of 72.7% in accordance with the literature.

Complex febrile convulsion was found with a rate of 35% in the study by Shinnar et al, 27.2% in the study by Verrotti et al and 10% in the study by Ling [8,11,12]. In our study, the rate of simple FC was 89.5% and complex FC was 10.5%. In accordance with the literature, the rate of complex FC was found to be lower.

Due to the fear of parents who see their children with seizures and the concern of physicians evaluating these children in emergency departments to miss a serious underlying brain disease, brain imaging is frequently performed in children with complicated FC. However, the diagnostic contribution of neuroimaging in these children is limited and not recommended. In studies, it has been found that imaging modalities such as CT are largely found to be normal in children with FC [13,14]. In our study, 66.9% of the patients admitted did not undergo CT scan, while 33.1% underwent CT scan. No mass or bleeding was detected in any of the patients who underwent CT scan. There is no need for CT scan in routine. CT scan may be considered in the presence of complicated FC.

In studies on routine investigations in children admitted with the cause of FC, no significant results were obtained in the evaluation of complete blood count, glucose, calcium, urea, creatinine and electrolytes and it was stated that routine investigations were not necessary [10,15,16]. In our study, sodium and glucose levels of the patients were evaluated as normal and no electrolyte disturbance was observed. Mean sodium level was  $137 \pm 13.9$  mmol/L, mean white blood cell (WBC) level was  $13.4 \pm 6.0 \times 10^3/\mu\text{L}$ , mean glucose level was  $117 \pm 29.8$  mg/dL and mean C-reactive protein (CRP) level was  $24.2 \pm 35.3$  mg/L.

In our study, when we look at the monthly distribution of cases in a 1-year period, it is noteworthy that FC showed a slight increase especially in November and May, and this increase is in parallel with the increase in the incidence of viral diseases, especially in these months.

## Conclusion

In the management of this condition, which is uncomplicated and has no long-term effects in most patients, it is important to avoid unnecessary tests and to provide accurate information to families. Physicians providing preventive health services have a great responsibility in this regard. Families should be adequately informed about fever. They should be told that although FC is apparently a frightening condition for them, it often has a benign course.

## Limitations of the study

The study was conducted in a hospital in Mardin province and cannot be generalized to the whole population. Another limitation of our study is that it was retrospective and the data were obtained from files.

## Statement of contribution of researchers

All authors declare that they have contributed to the article equally. ÖO, MNT, MS contributed to statistical analysis, the design of the study, and preparation of the article.

## Conflict statement

There are no potential conflicts of interest in this study.

## Support/Acknowledgment statement

No financial support was received from any institution or person related to the study.

## Ethical approval

Mardin Artuklu University Non-Invasive Clinical Research Ethics Committee, Date: 07.05.2024, Decision no: 2024/5-20.

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