RELATED FACTORS TO RECURRENCE OF FEBRILE SEIZURES IN CHILDREN AT CAN THO CHILDREN'S HOSPITAL 2022 – 2023

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Received:29/02/2024

Reviewed:19/03/2024

Accepted:10/05/2024

ABSTRACT

Background: *Febrile convulsions are a fairly common emergency in children, accounting for up to 2/3 of children with symptomatic convulsions in diseases with identified causes. Febrile seizures are a medical emergency in pediatrics. Seizure recurrence can affect the child in many ways, including the risk of injury, respiratory failure during a seizure, or increased risk of epilepsy. The recurrence of febrile seizures is directly related to prognosis and prevention in children.* ***Objectives:*** *1) Describe the clinical characteristics of febrile seizures in children from 6 months to 60 months at Can Tho Children's Hospital. 2) Risk factors for recurrent febrile seizures in children from 6 months to 60 months at Can Tho Children's Hospital.* ***Materials and methods:*** *Cross-sectional descriptive study with analysis of 125 children with febrile seizures.* ***Results:*** *Out of the total of 125 cases, the male/female ratio was 1.55/1, the age group with a higher percentage was 6 - 24 months old (51.2 %), 60% of children with febrile seizures were recorded with fever ≥ 39^0C,*

most cases were generalized seizures accounting for 98.4%. Regarding consciousness after a seizure, 1 case was recorded, corresponding to 0.8% of children with consciousness disorder after a seizure. The recurrence of febrile seizures was statistically significantly related to the type of febrile seizure ($p < 0.001$), the time from fever to the onset of the first seizure ($p < 0.05$), and morphology of seizures ($p < 0.05$). There is no relationship between recurrence of febrile seizures and age group, gender, temperature during seizures, as well as the child's history of surgery. assisted cesarean section/birth premature birth. ***Conclusions:*** *Recurrence of febrile seizures is associated with a number of clinical features such as the classification of febrile seizures, the interval between fever and the first seizure, and the morphology of seizures.*
Keywords: *seizures, recurrence, related factors, children.*

I. INTRODUCTION

Febrile convulsions are a fairly common emergency in children, accounting for up to 2/3 of children with symptomatic convulsions in diseases with identified causes. In Vietnam, febrile seizures are generally very common, affecting about 3% of children under 5 years old, of which, up to 26% of children will have recurrent febrile seizures [1], [2]. Seizure recurrence can affect the child in many ways, including the risk of injury, respiratory failure during a seizure, or increased risk of epilepsy in the child. According to Navneet Kumar and colleagues, studying a total of 528 children in 2019, 174 children (32.9%) had a recurrence and 354 children (67.1%) had one febrile seizure [3]. If there is a family history of febrile seizures, or if the first seizure occurred before 12 months of age or occurred with a fever below 39^0C (102^0F), the child is more likely to have > 1 seizure due to fever [4]. Children under 12 months at the time of their first febrile seizure have a 50% chance of having a second seizure within the first year, a risk that drops to 30% the following year [4], [5]. In addition, obstetric history, infection (site of infection, microorganisms), ... are also believed to be risk factors for recurrent febrile seizures. Can Tho Children's Hospital is one of the main medical facilities in the Southern region. Mastering the clinical characteristics and risk factors of recurrent febrile seizures in children here will provide important information to improve the management and treatment of pediatric patients. In the context of increasing numbers of recurrent febrile seizures in children, learning about clinical characteristics and risk factors at Can Tho Children's Hospital is necessary to help improve understanding and application of effective treatment measures. Starting from the above mentioned bases, we conduct research with the following goals:

1. Describe the clinical characteristics of febrile seizures in children from 6 months to 60 months at Can Tho Children's Hospital.

2. Investigate risk factors for recurrent febrile seizures in children from 6 months to 60 months at Can Tho Children's Hospital.

II. MATERIALS AND METHODS

2.1. Research subjects

All pediatric patients from 6 months to 60 months who visited Can Tho Children's Hospital were diagnosed with febrile seizures.

Sampling criteria: Children diagnosed with febrile seizures according to the Ministry of Health's diagnostic criteria in 2015 [6]:

Child’s age: 6 and 60 months.

Convulsion occurs when the child's fever is $\geq 38\ ^0$ C.

Absence of central nervous system infection.

No history of seizures unrelated previous fever.

No abnormalities in the nervous system.

Exclusion criteria

Refusal of participation by family members.

Seizures caused by abnormalities of whole-body metabolism.

Seizures after vaccination or exposure to toxins.

2.2. Research Methods

Research design: Analytical cross-sectional descriptive study

Location and time of research: Can Tho Children's Hospital, July 2022 to May 2023.

Sample size: Calculated according to the following formula:

$$n = Z^2_{1-\frac{\alpha}{2}} \frac{p(1-p)}{d^2}$$

Where:

p: The rate of recurrent febrile seizures in children under 60 months old is 26%, according to research by Than Thi Uyen at the Department of General Pediatrics - Bac Giang Obstetrics and Pediatrics Hospital in 2018 [1].

α: Choose α = 5%

$z_{1-\alpha/2}$ = 1.96

d: Choose d = 0.08

Substituting into the formula, the minimum sample size needed to be achieved is 115 samples. In fact, we obtained 125 samples.

Sampling method: Non-probability convenience sampling (selecting all pediatric patients who meet the sampling conditions during the data collection period)

Research content: Clinical characteristics of febrile seizures and related factors of recurrent febrile seizures in children aged 6 months - 60 months.

Data collection method: All eligible children were asked about their medical history, clinical examination and laboratory testing. Data collected on the survey form was standardized.

Data processing: Data were processed using SPSS 26.0 software. The main method involved descriptive analysis of frequencies and percentages; Determine the association in the form of frequency, percentages, odds ratios (OR), confidence interval (CI) 95% OR, Chi-square test or Fisher's Exact Test with significance level α = 0.05.

III. RESULTS

3.1. General characteristics of research subjects

Table 1. Age - gender characteristics of study subjects

Characteristic		Frequency	Percentage (%)
Age group	6 – < 24 months	64	51.2
	24 - 60 months	61	48.8
Sex	Male	76	60.8
	Female	49	39.2

There is a similarity between the two age groups of 6 - < 24 months and 24 - 60 months, accounting for 51.2% respectively and 48.8%. Regarding gender, the proportion of male pediatric patients is higher than that of female pediatric patients, male/female ratio is 1.55/1.

3.2. Clinical features of febrile convulsions

Table 2. Rate of recurrence Febrile seizures

Characteristic		Frequency	Percentage (%)
Seizure	Recurrent	12	9.6
	No recurrent	113	90.4

According to our research, out of the total of 125 cases, 12 pediatric patients had recurrence Febrile seizures (9.6%).

Table 3. Clinical features of febrile convulsions

Clinical features		Frequency	Percentage (%)
Temperature during seizures	≥ 39 ^{0}C	75	60
	< 39 ^{0}C	50	40
Seizure duration	< 5 minutes	64	51.2
	≥ 5 minutes	61	48.8
Time from fever to seizure	≥ 24 hours	52	41.6
	< 24 hours	73	58.4
Morphology of seizures	General	123	98.4
	Local	2	1.6
Consciousness after a seizure	Conscious	124	99.2
	Perception disorder	1	0.8

Temperatures during seizures were recorded at a higher level (≥ 39^{0}C), seizure duration did not differ much between the two groups, < 5 minutes and ≥ 5 minutes. The time from fever onset to seizure was typically reported to be less than 24 hours (58.4%). Of the total of 125 pediatric patients hospitalized for febrile seizures, most of which were generalized seizures (98.4%). Regarding consciousness after a seizure, 1 case was recorded, corresponding to 0.8% of children with consciousness disorder after a seizure.

3.3. Related factors recurrence of febrile convulsions

Table 4. The relationship between clinical signs and recurrence Febrile seizures

Related factors		Recurrence of febrile seizures		p	OR (95% CI)
		Yes n (%)	No n (%)		
Age group	6 - < 24 ms	9(14.1)	55(85.9)	0.083	3.16 (0.81-12.29)
	24 - 60 ms	3(4.9)	58(95.1)		
Sex*	Male	7(9.2)	69(90.8)	1.000	0.89 (0.26-2.98)
	Female	5(10.2)	44(89.8)		
Classification of febrile convulsions*	Simple	0(0)	90(100)	**p < 0.001**	-
	Complicated	12(34.3)	23(65.7)		
Time from fever to seizure*	≥ 24 hours	0(0)	52(100)	**p = 0.001**	-
	< 24 hours	12(16.4)	61(83.6)		
Temperature during seizures*	≥ 39^{0}C	5(6.7)	70(93.3)	p = 0.219	0.44 (0.13 - 1.47)
	> 39^{0}C	7(14.0)	43(86.0)		
Morphology of seizures*	Local	2(100)	0(0)	**p = 0.009**	-
	General	10(8.1)	113(91.9)		

There is an association between the recurrence of febrile seizures and the type of febrile seizures ($p < 0.001$), the interval from fever to the first seizure ($p = 0.001$) and the morphology of seizures ($p = 0.009 < 0.05$). The difference was not statistically significant between recurrent febrile seizures and the age group, gender and temperature ($p > 0.05$).

Table 5. The relationship between neonatal history and recurrence Febrile seizures

Related factors		Recurrence of febrile seizures		p	OR (95% CI)
		Yes n (%)	No n (%)		
Assisted cesarean section/birth	Yes	7(17.1)	34(82.9)	p = 0.058	3.25 (0.96-10.97)
	No	5(6)	79(94)		
Premature birth*	Yes	2(28.6)	5(71.4)	p = 0.135	4.32 (0.74-25.19)
	No	10(8.5)	108(91.5)		

The difference was not statistically significant between recurrent febrile seizures child's and the history of cesarean section assisted pregnancy/birth and premature birth ($p > 0.05$).

IV. DISCUSSION

4.1. General characteristics of research subjects

According to our research, male and female pediatric patients account for 60.8% and 39.2% respectively, with the male/female ratio is 1.55/1, this result is similar to some studies including Than Thi Uyen with male/female ratio of 2.13/1 [7] and Bui Thu Phuong with male cases accounting for 63.9% [8]. Regarding age groups, there is not much difference between groups 6 - < 24 months and group 24 - 60 months, of which, the 6 - 24 months group accounts for a higher proportion of 51.2%. Similarly, 65% of pediatric patients with febrile seizures were recorded in the age group < 24 months according to the results of the study by Ram Prasad Pokhrel and colleagues, the age group with the highest proportion was 13 - 24 months with 45% [9].

4.2. Clinical features of febrile seizures

Most of the febrile seizures are generalized seizures, and partial seizures are rarely observed. Generalized seizures account for 98.4% of cases, corresponding to 100% according to research by Bui Thu Phuong and colleagues [8]. Temperatures during convulsions were recorded at a higher level ($\geq 39^0$C). This result is similar to Than Thi Uyen's research, showing that convulsions occur most often when body temperature is at 39 degrees, and above accounts for 66.9%, below 39 degrees is 33.1% [7]. However, 2 studies have not agreed on the duration of seizures, in which our study has not clearly shown the difference. The difference between the two groups of seizure duration, the proportion of seizures less than 5 minutes and 5 minutes or more is 64 and 61 respectively. In Than Thi Uyen's study, the majority of seizures last less than 5 minutes, accounting for 98.8%, 1.2% of cases had seizures longer than 5 minutes [7].

4.3. The rate of recurrent Febrile seizure

Among 125 pediatric patients in our study, 12 cases (9.6%) developed recurrent febrile seizures. Worawit Kantamalee et al. found that there was 52 out of 261 (19.92%) cases had more than one seizure [10]. Another study conducted on 300 pediatric patients diagnosed with febrile seizures, seizures recurred in 180 (60%) of the patients, of these, 82 (27.3%) had 2 seizures, 43 (14.3%) had 3 seizures, and 55 (18.3%) had 4 or more episodes of febrile seizures. The rate of recurrence febrile seizures fluctuates in different studies, for the reason, we need to better understand the risk factors for recurrent febrile seizures to proactively monitor and intervene when necessary [11].

4.4. Related factors to recurrence of febrile seizures

In this study, we did not observe a relationship between the recurrence of febrile seizures and age, although it can be seen that the < 24-month-old group accounted for a higher rate than the ≥ 24-month-old group. However, the difference between these two groups was not statistically significant. Similarly, we found no evidence to suggest that gender is a risk factor for recurrence of febrile seizures (p = 1.000).

The febrile seizure type has been shown to be associated with the recurrence of febrile seizures (p < 0.001), Among 12 patients who experienced more than 1 seizures, the complex type accounted for 100%, therefore, pediatric patients with complicated febrile seizures require closer monitoring due to the risk of recurrence play high. This result is different from Nuvneed Kumar's, this study said that the recurrence of febrile seizures was not related to the type of seizure (p = 0.692 > 0.05). The discrepancy may be due to the fact that the number of samples in our study was not large enough, and the rate of complex forms is not common in clinical practice [3].

A statistically significant difference was observed between febrile seizure recurrence and the time from fever to seizure onset with p = 0.001. Than Thi Uyen's research results showed that from the time of fever until seizures appear, most of the time is in the first 24 hours, 84.6%, less than 12 hours from the start of fever accounts for 56.2%, after 24 hours accounts for a small percentage of 15.4%, less than 12 hours is 56.2% [7].

The morphology of seizures is an important risk factor of recurrent febrile seizure. Our study found that all cases with the partial seizures were recorded as having more than 1 seizure, with p = 0.009 > 0.05. However, Ahmet Burak Civan's study shows that this characteristic does not increase the risk of recurrence of febrile seizures [11]. This difference may be due to our sample size not being large enough while partial seizures are rare in clinical practice.

Our study currently does not have enough evidence to prove the association between recurrent febrile seizures and temperature during seizures. This result is not consistent with Navneet Kumarrong's study. Seizure recurrence tends to decrease significantly when temperature increases and recurrence occurs only in 17.2% of children with temperature ≥ 40^0C compared to with 52.5% of children having a temperature > 38^0C during a seizure, with OR = 0.34, 95%CI = 0.15 - 0.76, p = 0.009. The difference between the 2 studies may be due to the fact that our study period only lasted for the duration of the child's hospital stay, while Navneet and colleagues monitored continuously for at least 3 months [3].

Obstetric history such as cesarean section/assisted birth was not associated with recurrent febrile seizures (p = 0.058 > 0.05). This result is different from Hoang Minh Tien's study (2017) with p = 0.019 < 0.05 [12], indicating that the cesarean section/assisted birth group is at risk of having recurrent febrile seizures. So, to learn more clearly, more studies on the association are needed, this is to proactively provide better prevention for children. However, the two studies were similar in showing a statistically insignificant difference between febrile seizures and the child's history of premature birth. This result also corresponds to Nguyen Van Bac et al. (p > 0.05) [1].

V. CONCLUSION

Convulsions occur more commonly in male pediatric patients, with generalized seizures being the main characteristic. The age group with a higher rate of febrile seizures is 6 - < 24 months. The most commonly reported cause of fever is upper respiratory

infection, followed by intestinal infection. The recurrence of febrile seizures was statistically significantly related to the classification of febrile seizures and the type of cesarean section/assisted birth in children 6 months - 60 months. The relationship between recurrent febrile seizures and family history of febrile seizures and the child's history of premature birth cannot be confirmed.

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