

A DESCRIPTIVE STUDY ON THE CLINICAL PATTERN OF FEBRILE SEIZURES IN CHILDREN AGED 6 MONTHS TO 5 YEARS

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ABSTRACT:

Background: Febrile seizure is one of the most common seizure disorders among children between 6 months and 5 years of age and is usually associated with fever and without evidence of intracranial infection or metabolic imbalance.

Objective: To study the clinical pattern of febrile seizures in children aged 6 months to 5 years presenting to a tertiary care teaching hospital.

Method: This was a hospital based observational descriptive research conducted at the Department of Paediatrics in Netaji Subhas Medical College and Hospital, Jamshedpur, Jharkhand, India among 95 children diagnosed with febrile seizure. Age, age at first episode, seizure type, seizure presentation, seizure frequency, family history, aetiology of fever, results of lumbar puncture and recurrence data were gathered and analysed by frequency, percentage and relevant statistical tests.

Result: The biggest number of children was in the 13–24 months age group (37.9%). The first episode was also most typically seen at 13–24 months (51.6%). Simple febrile seizure was the most prevalent kind (76.8%) and presentation was generalised tonic clonic seizure (71.6%). Seventy-seven (81.1%) of children experienced one episode of seizure. The most common cause of fever was upper respiratory tract illness (55.8%). Recurrence was seen in 31 children and the age at first episode ≤ 12 months was significantly associated with recurrence ($p=0.03$).

Conclusion: Febrile seizure was prevalent in children less than two years of age and simple febrile seizure was the commonest form. Those with an earlier age at first episode were considerably more likely to have a recurrence.

KEYWORDS: Febrile seizure, Children, Simple febrile seizure, Recurrence, Generalized tonic-clonic seizure

1. INTRODUCTION

Febrile seizure (FS) is the predominant form of seizure disorder in children, characterized by its age-specific occurrence, association with a fever of 38.0°C or higher, and absence of identifiable causative conditions, such as central nervous system (CNS) infections or metabolic abnormalities [1,2]. The majority of FS instances are benign and self-resolving, and typically, treatment is not advised [3].

FS has been characterized variably by the National Institutes of Health (NIH), the International League Against Epilepsy (ILAE), and the American Academy of Paediatrics (AAP). The NIH (1980) defined febrile seizures (FS) as an abnormal, sudden and excessive electrical discharge of neurons (grey matter) that transmits through neuronal processes (white matter) to influence an end organ in a clinically measurable manner, occurring during infancy or childhood, typically between 3 months and 5 years of age, associated with fever but without evidence of intracranial infection or a defined etiology [4].

The ILAE (1993) defined febrile seizures (FS) as seizures occurring in children after one month of age, linked to a febrile illness not attributable to central nervous system infection, without prior neonatal seizures or unprovoked seizures, and without fulfilling the criteria for other acute symptomatic seizures [5]. The AAP (2008) recently defined febrile seizures (FS) as seizures occurring in febrile children aged 6 to 60 months, excluding those with cerebral infections, metabolic disturbances or a history of afebrile seizures.

FS is classified as a "syndrome" due to several shared characteristics among affected children: (1) FS typically manifests within a limited age range; (2) most children with FS exhibit normal neurological and structural development following the episode; and (3) FS is not linked to structural or developmental brain anomalies, although such pathology may increase susceptibility to FS [6]. Genetics, comorbidities (such as preterm delivery and foetal development retardation), and environmental risk factors (including in utero nicotine exposure and antihistamine usage) may elevate the chance of FS, alongside the age factor [7,8]. Febrile seizures are the most prevalent kind of seizures, occurring in 2-5% of children under five years of age, characterized by the presence of fever without indications of cerebral infection or severe electrolyte imbalance [9].

The recurrence of seizure episodes and apprehension about epilepsy are significant parental worries over the long-term implications of febrile seizures. Efforts to ascertain variables linked to recurrence have identified that a first episode of febrile seizure occurring before 12 months of age, complicated febrile seizures, a family history of seizures and a fever below 40 degrees Celsius are related with recurrence [10]. Nevertheless, other research demonstrated contradictory findings [11,12].

The etiology of fever differs across distinct research. Seizures are prevalent globally, particularly in children, and have several aetiologies. They are the most prevalent and alarming paediatric neurological conditions, with 4-10% of children suffering at least one seizure during the first 16 years of life. Children under the age of 3 exhibit a higher incidence of seizures compared to older children [13].

Seizures can be benign and self-limiting, need minimum intervention, or may indicate the onset of a severe medical condition. The prevalent causes of seizures are influenced by regional variances. Febrile seizures (FS) are documented in several studies as the predominant kind of seizures observed in the paediatric demographic, with the majority occurring in children under five years of age [14]. Infections are the primary related causes and have favourable outcomes [15]. It impacts 2% to 4% of all children in Europe and the United States by the age of five. The prevalence in different regions ranges from 0.35% in Hong Kong [16], 1% in China, to over 8% in Japan and 14% in Guam.

This study aimed to assess the demographic and clinical profiles of children with febrile seizures admitted to our teaching hospital over the course of one year.

2. METHODOLOGY

2.1 Study Design

This study was a hospital-based observational descriptive study conducted among children presenting with febrile seizures. The demographic profile, clinical features, seizure type, aetiology of fever, lumbar puncture results, recurrence of febrile seizures and variables related with recurrence were studied.

2.2 Study Area

The study was conducted in Department of Paediatrics, Netaji Subhas Medical College and Hospital, Adityapur, Saraikela Kharsawan, Jharkhand, India.

2.3 Study Duration

The study was conducted over a one-year period from June 2025 to May 2026.

2.4 Sample Size

The research comprised 95 children in all who were diagnosed with febrile seizure.

2.5 Study Population

The research population was constituted of children of age group 6 months to 5 years who were presenting to the Department of paediatrics with seizure associated with fever, throughout the study period of one year and fulfilling the diagnostic criteria of febrile seizure.

2.6 Inclusion Criteria

- Children 6 months to 5 years of age.
- Children who come with a seizure linked with fever.
- Children with clinically confirmed febrile seizure.
- Children, if relevant, whose parents/guardians provided approval for participation/use of data.

2.7 Exclusion Criteria

- Children under 6 months.
- Children are 5 years old and older.
- Children with history of afebrile seizures.
- Children with epilepsy.
- Children suffer from illnesses of the central nervous system such meningitis or encephalitis.
- Children with pre-existing neurological impairment or poor neurodevelopment
- Children experiencing seizures secondary to acute metabolic abnormalities or electrolyte imbalance.

2.8 Data Collection

Data were obtained from patient records, clinical examination findings, investigation reports and history given by parents or guardians using a pre-designed structured proforma. Data on age, sex, age of first febrile seizure episode, type and duration of seizure, number of seizure episodes, interval between fever onset and seizure, temperature at admission, family history of febrile seizure or epilepsy, cause of fever, lumbar puncture results, and febrile seizure recurrence were collected. All data obtained were reviewed for completeness and correctness prior to entry for statistical analysis.

2.9 Study Procedure

All the children with fever-related seizures were clinically assessed in Department of Paediatrics. Detailed information of fever, type of seizure, duration and number of seizure episodes, prior history and family history was acquired from parents/guardians. The children were examined, both generally and neurologically, and were categorized as having simple or complicated febrile seizures. Relevant investigations like lumbar puncture were done only when clinically needed. The cause of fever was diagnosed and variables for recurrence were documented for study.

2.10 Statistical Analysis

Data were placed into a spread sheet and analyzed using relevant statistical tools. Categorical variables are presented as frequency and percentage. Chi-square test or Fisher's exact test was used to examine the connection between recurrence of febrile seizure and chosen factors as appropriate. Statistical significance was set at a p value <0.05.

3. RESULT

Table 1 illustrates the age distribution of children and age at first episode of febrile seizure. The research involved a total of 95 youngsters. Most of the children were within the age range 13-24 months (36 cases, 37.9%) followed by 6-12 months (24 cases, 25.3%). The prevalence declined with increasing age; 18 children (18.9%) in the 25 to 36 months group, 11 children (11.6%) in the 37 to 48 months group and 6 children (6.3%) at 49 months or above. Forty-nine children (51.6%) in the age group of 13–24 months had the first episode of febrile seizure in majority of the children, followed by children ≤12 months in 33 children (34.7%) and children >24 months in 13 children (13.7%).

Table 1: Age-wise Distribution of Children and Age at First Episode of Febrile Seizure		
Variables	Frequency	Percentage
Age-wise distribution of children		
6–12 months	24	25.3
13–24 months	36	37.9
25–36 months	18	18.9
37–48 months	11	11.6
≥49 months	6	6.3
Age at first episode of febrile seizure		
≤12 months	33	34.7
13–24 months	49	51.6
>24 months	13	13.7
Total	95	100

Table 2 shows the kind of febrile seizure and seizure symptoms. Simple febrile seizure was the major kind which was reported in 73 children (76.8%) whereas complicated febrile seizure was identified in 22 children (23.2%). Generalized tonic clonic seizure was the commonest appearance of seizure manifestation in 68 children (71.6%) followed by generalized tonic seizure in 26 children (27.4%). Focal seizure was uncommon and was noted in just 1 child (1.0%).

Table 2: Distribution of Children According to Type of Febrile Seizure and Seizure Manifestation		
Variables	Frequency	Percentage
Type of febrile seizure		
Simple febrile seizure	73	76.8

Complex febrile seizure	22	23.2
Type of seizure manifestation		
Generalized tonic clonic seizure	68	71.6
Generalized tonic seizure	26	27.4
Focal seizure	1	1
Total	95	100

Table 3 shows frequency of seizure events and family history. Single episode of seizure with febrile illness was seen in 77 children (81.1%). In 8 children (8.4%) there were two episodes and three episodes, and in 2 children (2.1%) there were four episodes. Family history was positive in 11 (11.6%) children with febrile seizure and 2 (2.1%) children with epilepsy whereas 82 (86.3%) children had no significant history of family.

Table 3: Distribution of Children According to Frequency of Seizure Episodes and Family History		
Variables	Frequency	Percentage
Frequency of seizure episodes		
One episode	77	81.1
Two episodes	8	8.4
Three episodes	8	8.4
Four episodes	2	2.1
Family history		
Febrile seizure in family	11	11.6
Epilepsy in family	2	2.1
No significant history	82	86.3
Total	95	100

Table 4 presents the etiology of fever and the results of lumbar puncture. The most prevalent cause of fever was upper respiratory tract infection in 53 children (55.8%), followed by acute gastroenteritis in 18 children (18.9%), pneumonia in 15 children (15.8%), urinary tract infection in 8 children (8.4%) and abscess in 1 kid (1.1%). In the majority of instances, 59 children (62.1%), lumbar puncture was not indicated. 23 children (24.2%) of the remaining children showed normal cerebrospinal fluid results. 13 children (13.7%) declined lumbar puncture.

Table 4: Distribution of Children According to Etiology of Fever and Lumbar Puncture Findings		
Variables	Frequency	Percentage
Etiology of fever		
Upper respiratory tract infection	53	55.8
Pneumonia	15	15.8
Acute gastroenteritis	18	18.9
Urinary tract infection	8	8.4
Abscess	1	1.1

Lumbar puncture findings		
Normal CSF findings	23	24.2
Lumbar puncture refused	13	13.7
Lumbar puncture not indicated	59	62.1
Total	95	100

Table 5 shows how selected characteristics are associated with the recurrence of febrile seizures. In 64 children recurrence was missing while in 31 children it was present. Recurrence was detected in 25 (34.2%) children with simple febrile seizure and 6 (27.3%) children with complicated febrile seizure. This correlation was not statistically significant. Sex, family history of febrile seizure, duration of seizure, temperature at admission, interval between seizure and fever and frequency of seizure were not significantly linked with recurrence. However, age at first episode was statistically significantly associated with recurrence. Children who had their first episode at ≤ 12 months had a greater recurrence rate, 15 cases (45.5%) compared to those who had their first episode between 13–24 months, 16 cases (25.8%).

Table 5: Association of Selected Clinical Variables with Recurrence of Febrile Seizure				
Parameters	Recurrence Absent n (%)	Recurrence Present n (%)	Total	p value
Type of febrile seizure				0.61
Simple febrile seizure	48 (65.8)	25 (34.2)	73	
Complex febrile seizure	16 (72.7)	6 (27.3)	22	
Sex				0.56
Male	42 (65.6)	22 (34.4)	64	
Female	22 (71.0)	9 (29.0)	31	
Age category at first episode				0.03*
≤ 12 months	18 (54.5)	15 (45.5)	33	
13–24 months	46 (74.2)	16 (25.8)	62	
Family history of febrile seizure				0.17
Positive history	5 (45.5)	6 (54.5)	11	
Negative history	59 (70.2)	25 (29.8)	84	
Seizure duration				0.7
5–10 minutes	61 (67.0)	30 (33.0)	91	
10–15 minutes	3 (75.0)	1 (25.0)	4	
Temperature at admission				0.34
$\leq 37.8^{\circ}\text{C}$	20 (60.6)	13 (39.4)	33	
$> 37.8^{\circ}\text{C}$	44 (71.0)	18 (29.0)	62	
Interval between seizure and fever				0.79
≤ 10 hours	40 (65.6)	21 (34.4)	61	

>10 hours	24 (70.6)	10 (29.4)	34	
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4. DISCUSSION

The present hospital based descriptive study was carried out to analyze the clinical pattern of febrile seizures among children aged 6 months to 5 years presenting to a tertiary care teaching hospital. Febrile seizures are one of the most frequent neurologic illnesses of kids and are often benign, but recurrence and the potential for epilepsy remain important concerns to parents and caregiver [1,2].

In the present study most of the children were in age range of 13-24 months and more than half of them had their first episode of febrile seizure in the same age group. These results are in line with earlier research showing that febrile seizures are prevalent in infancy and early toddler years, due to the increased sensitivity of the immature brain to fever-related neuronal excitability [3,4]. Similar age preponderance with the greatest prevalence below two years of age has also been found by Sfaihi et al and Ojha et al [5,6].

In our present study, the percentage of male children is greater which is in keeping with the observations of various previous studies revealing male preponderance in patients with febrile seizures [7,8]. The sex predominance of this disease is not known, however genetic vulnerability and developmental variations in the juvenile nervous system have been suggested.

The predominant kind of seizure in the current study was simple febrile seizure which included more than three fourth of the cases whereas complicated febrile seizure constituted lower percentage. This is consistent with the common epidemiologic literature which states that uncomplicated febrile seizures are the majority of febrile seizure presentations in children [1,9]. Similar findings were also observed by Verity et al. and Adhikari et al., where simple febrile seizures were substantially more common than complicated febrile seizures [10,11].

The preponderance of uncomplicated febrile seizures in the present investigation supports the typically benign character and favorable prognosis of febrile seizure disorders in kids. Generalized tonic-clonic seizure was the most prevalent seizure manifestation in the present research followed by generalized tonic seizure whereas focal seizures were rare. Similar findings have been observed in earlier paediatric research, where generalized seizure patterns were the main clinical presentation [11,12].

The low frequency of focal seizures in the present research suggest that majority of the children met the criteria of simple febrile seizures rather than an underlying neurological illness. Most children suffered a single seizure episode during the febrile illness. Multiple seizure events during the same illness were substantially less prevalent. Comparable results were seen in research by Chung et al. and Veisani et al. which revealed that single seizure episodes are the most common manifestation of febrile seizure [13,14].

The low rate of recurrence of seizure episodes in the same febrile illness may further corroborate the benign clinical course seen in the majority of patients. In terms of family history, a few children had a positive family history of febrile seizures or epilepsy whereas the majority had no relevant family history. Genetic predisposition has been identified as a significant risk factor for febrile seizures and their recurrence [14,15]. However, the proportion of genetic predisposition in the present investigation was lower, which may be due to under reporting, a smaller sample size, or regional genetic heterogeneity. Recurrence was also substantially greater in children with a positive family history although this link was not statistically significant.

The most frequent cause of fever in the present investigation was upper respiratory tract infection, which was followed by acute gastroenteritis and pneumonia. The main trigger for febrile seizures in prior investigations was viral respiratory tract infections, and similar findings have been described [6,11]. Fever due to respiratory tract illness may be a major trigger for seizures due to fast rise of body temperature and inflammatory cytokine production. Findings also reveal that common paediatric infections still seem to be the main underlying disorders triggering febrile seizures.

Most children did not require a lumbar puncture. Children who had lumbar puncture had a normal cerebrospinal fluid analysis. These results agree with the guidelines of the American Academy of Paediatrics which state that lumbar puncture should be reserved for selected patients in whom meningitis or central nervous system infection is clinically suspected [9]. The lack of aberrant CSF fluid results in the present research further emphasizes that febrile seizures are typically not linked with cerebral infection in otherwise clinically stable children.

A major finding of the present investigation was the statistically significant link between recurrence and younger age at first febrile seizure episode. Children less than or equal to 12 months at first febrile seizure had a greater recurrence risk than older children. This finding is in line with earlier research that have identified early age at beginning as one of the greatest predictors of recurrent febrile seizures [16]. Veisani et al. have observed an increased risk of recurrence of children with early onset febrile seizures, due to extended susceptibility of the developing brain to febrile diseases [14].

On the other hand, no significant connection was found between recurrence and sex, type of seizure, length of seizure, family history, temperature on admission, interval between fever and seizure and frequency of seizure.

Similar results were reported in other previous research; however, there are inconsistent reports in the literature about these risk variables [6,16]. The present investigation did not find a significant correlation which may be related to moderate sample size and preponderance of uncomplicated febrile seizures.

Results of the current study showed that febrile seizures are more common in younger children, especially in children below 2 years of age and typically are characterized by uncomplicated generalized seizures with favorable

clinical outcome. Upper respiratory tract infection is the most prevalent triggering illness and children with an earlier age at commencement are more likely to have a recurrent illness. Early detection, family counselling and proper professional evaluation continue to be important in decreasing anxiety and preventing unneeded examinations or procedures.

5. CONCLUSION

The current study concluded that febrile seizure is a frequent neurological manifestation in children aged 6 months to 5 years with the most incidence in children below two years of age especially in the 13-24 months age group. The first occurrence of febrile seizure was likewise most common in this age group. The most prevalent clinical category was simple febrile seizure, and the most common seizure presentation was generalized tonic-clonic seizure. Most children had one seizure episode during the febrile illness and most had no substantial family history of febrile seizure or epilepsy. The most common cause of fever was upper respiratory tract infection, followed by acute gastroenteritis and pneumonia. In most cases lumbar puncture was not necessary and when cerebrospinal fluid readings were normal the recurrence of febrile seizure was noted in a substantial proportion of children but of the characteristics analyzed, only age at first episode ≤ 12 months had statistical connection with recurrence. Early age presentation should be taken as a significant predictor for recurrence. Parents of such children should be counselled on benign nature of febrile seizures, risk of recurrence, fever treatment and proper first-aid measures during seizure episodes.

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