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Original Article

Febrile Seizure: A Study among Children Admitted in Pediatric Ward

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Abstract

Background: Febrile Seizure is one of the most common pediatric emergencies seizure disorders that occur in children aged 6–60 months. The objective of the study was to assess the demographic features and etiological factors for a febrile seizure.

Materials and Methods: This was a hospital-based descriptive cross-sectional study conducted in the Department of Pediatrics, JNIMS, Imphal among children presenting with febrile seizure admitted in pediatric ward from January 2019 to December 2019. The scientifically calculated sample size of 160 was included as study subjects. Children between 6 months and 5 years were included in the study. Children not meeting the age criteria were excluded from the study. The demographic and clinical data were collected from inpatient records and analyzed.

Results: A total of 160 children which constituted 6.1% of total pediatric admissions were included in the study. Mean age of children was 21.46 ± 12.98 months. Maximum cases 65 (40.6%) were in the age group 12–24 months. About 117 (73.1%) were male and 43 (26.87%) were female. Majority 28 (17.5%) of cases occur in the monsoon season (June). Simple febrile seizure and complex febrile were seen in 119 (74.4%) and 41 (25.6%), respectively. Children who developed first episode of febrile seizure (100%) were below 24 months of age. Generalized tonic-clonic seizures were the most common presentation. About 53 (33.1%) of affected children had positive family history of febrile seizure. Most common precipitating factors were upper respiratory infection 138 (86.3%), gastroenteritis 22 (13.8%). First episode of complex febrile seizure after 12 months (P = 0.000), higher prevalence of complex febrile seizure duration >15 min (P = 0.000) and complex febrile seizure had longer hospital stay (P = 0.000).

Conclusions: Febrile seizure is a common pediatric problem in male child observed predominantly in children below the age of 2 years. Simple febrile seizure was the commonest presentation. Most of the children had a positive family history and the most common causative factors were upper respiratory infection, gastroenteritis. Risk of febrile seizure decreased with age.

Keywords: Complex febrile seizure, Febrile seizure, Simple febrile seizure

INTRODUCTION

Febrile seizures are that occur between the age of 6 and 60 months with a temperature of 38°C (100.40°F) or higher, that are not the result of central nervous system infection or any metabolic imbalance and that occur in the absence of a history of prior afebrile seizures, occurring in 2–5% of children. Most commonly affected age is between 12 and 18 months.[1] Febrile seizures are classified as simple and complex types. Approximately 60–90% of febrile seizures are simple type.[2] Simple febrile seizures are generalized seizures, lasting <15 min, not recurring within 24 h or associated with postictal neurological abnormalities. Complex febrile seizures are focal, prolonged, or recurrent within 24 h or associated with postictal neurological abnormalities including Todd paresis.[3] Febrile convulsions appear to occur in families and both parents may transmit this genetic susceptibility. Family history of febrile convulsions and reported frequency ranges from 9% to 22% in their siblings.[4] Viral infection (80%) is the most common cause of fever in febrile seizures.[5] Viral upper respiratory tract infection, pharyngitis, otitis media, and gastroenteritis are other important causes of fever in febrile seizures.[6,7] Western European and US epidemiological reports indicate that

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febrile convulsions are associated with upper respiratory infections and other infectious diseases.[8] Seasonal variation with regard to seizure incidence has not yet been fully understood. Studies have shown that febrile seizure tends to occur more in the winter months and common in the evening.[9] Hence, the objective of the study was to assess the demographic features and etiological factors for febrile seizure among the children admitted in the ward.

MATERIALS AND METHODS

This was a hospital-based descriptive cross-sectional study conducted at the Department of Pediatrics, JNIMS, Imphal from January 2019 to December 2019 among children admitted with febrile seizures from records of children during the study period.

Inclusion Criteria

Based on the standard definition of febrile seizure records of all children with the diagnosis of febrile seizure were included.

Exclusion Criteria

Children with previous episodes of afebrile seizures, neurodevelopmental disorders, age below 6 months and above 5 years were excluded from the study.

Sample Size

A sample size of 160 was calculated at 95% confidence interval at 5.8% acceptable margin of error by epi info software version 7.2. All children between 6 months and 5 years of age who were diagnosed as febrile seizure were included in the present study. Children's demographic, clinical data regarding type of seizures, duration, number of episodes of seizures, family history of febrile seizures, causes of fever, and duration of hospital stay were obtained from hospital medical records.

Statistical Analysis

All the data were recorded on Microsoft excel spreadsheet and data analysis was done at 5% alpha and 95% confidence interval using SPSS v22 software. Descriptive statistics such as Mean, SD, Percentage were used and analytical analysis was done using Chi-square test. $P < 0.05$ was considered as statistically significant.

RESULTS

A total of 160 children which constituted 6.4% of pediatric admission with febrile seizure who fulfilled the selection criteria were included in our study. Among the study groups, the youngest child was 6 months and the oldest 60 months of age. The mean age of children was 21.46 ± 12.98. The age ranged from 6 months to 60 months. Our study revealed that out of 160 children in the study group, febrile seizures were most common in the age group 12–24 months 40.6% (65) followed by 32.5% (52) between 6 and 12 months of age group. Study of result showed 117 (73.1%) were male and 43 (26.9%) were female. Most of the children in the study group were males. 53 (33.1%) children had positive history of febrile seizure in the family, out of which three had a family history of febrile seizure in both the parent and 5 had a history of febrile seizure in older siblings [Table 1].

According to seizure characteristics, the most common presentation was simple febrile seizure 119 (74.4%) and complex febrile seizure in 41 (25.6%) cases. Seizures were more common in males as compared to females with male-to-female ratio of 2.7:1. Generalized tonic-clonic seizure was the most frequent type of seizure presentation [Table 2].

Month wise seasonal variations in the incidence of febrile seizure were observed with the maximum number of cases in the month of June 28 (17.5%) and the lowest in February 4 (2.5%) [Figure 1].

Majority of children 103(64.5%) had single episode of seizure and 57 (35.6%) had >2 episodes of febrile seizure. The first episode of febrile seizure was more common in children >12 months of age group 97 (60.6%) followed by 63 (39.4%) in children <12 months. Most

Table 1: Age, Sex, and Family history distribution data of patients presenting with seizures

Demographic history	No of cases	Percentages
Age		
6–12 months	52	32.5
12–24 months	65	40.6
24–60 months	43	26.9
Total	160	100
Sex		
Male	117	73.1
Female	43	26.9
Total	160	100
Family history		
Present	53	33.1
No	107	66.9
Total	160	100

Table 2: Distribution of seizure type of patients presenting with seizures

Type of seizure	No of cases	Percentages
Simple	119	74.4
Complex	41	25.6
Total	160	100

common precipitating factor for febrile seizures was upper respiratory tract infection in 138 (86.3%) children followed by gastroenteritis 22 (13.8%). In 138 (86.3%) children the duration of seizure was <than 15 min followed by 28 (13.8%) children with seizure >15 min. The length of hospitalization in 124 (77.5%) was 1 to 2 days and 26 (16.3%) children the hospitalization period was 3 to 7 days and in 10 (6.3%) children the period of hospitalization was >7days [Table 3].

Mean (SD) duration of hospitalization was found to be 1.29 ± 0.576 days.

Table 4 showed the prevalence of complex febrile seizure was 71.9% (41 out of 57) in children with first episode of seizure at an age >12 months whereas the prevalence of complex febrile seizure was zero in children with first episode of febrile seizure at an age <12 months ($P = 0.000$). Children who had seizure episodes lasting >15 min complex febrile seizure 100% (22 out of 22) whereas in children with seizure episodes lasting <15 min the prevalence of complex febrile seizure was 13.8% (19 out of 138) with ($P = 0.000$). Table also showed that with the increased in length of hospital stay the prevalence of complex febrile also increased (10.5% in 1–2 days and 90% in >7 days $P = 0.000$). However, no statistically significant results were found in age, sex, family history, and etiology of febrile seizure.

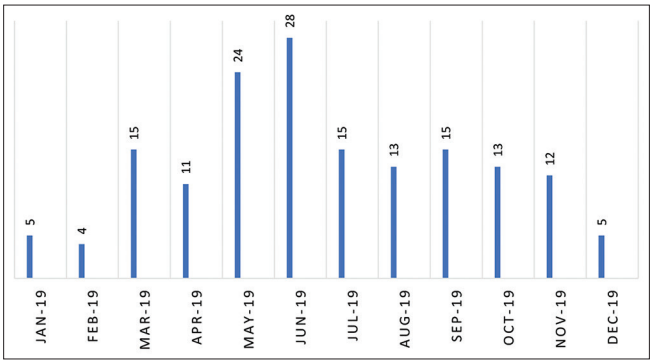

Figure 1: Month-wise prevalence of febrile fever

DISCUSSION

Febrile seizure is one of the most common seizures in childhood.[10] In the present study, febrile seizures represent 6.1% of total pediatric admissions which was comparable to study that showed the proportion in 6.1% of among 325 total admissions.[11] The majority of febrile seizure predominantly occurred in children below 24 months of age and this was in agreement with other studies.[12-14] The febrile seizure is age-dependent this should be considered as critical for developing febrile seizure. The incidence of febrile seizures decreased as age increased. Our study showed children in the age group of 12–24 months are more commonly affected. Peak incidence at 18 months of age had been observed in children between 6 months and 5 years in another study which was comparable to present study.[15] Mean age of children with febrile seizure was 21.46 ± 12.98 months which was comparable to other studies.[16,21] Male-to-female ratio was 2.7:1 in the present study. Another study had shown ratio of 2.9:1 in total 150 study population which was comparable to our study.[30]

Table 3: Distribution of causative factors during seizure among the patients

Causative factors	No of Cases	Percentages
Seizure frequency		
1	103	64.4
>2	57	35.6
Total	160	100
Age at first episode		
<12 months	63	39.4
>12 months	97	60.6
Total	160	100
Etiology of fever		
URTI	138	86.3
AGE	22	13.8
Total	160	100
Duration of seizure		
<15 min	138	86.3
>15 min	22	13.8
Total	160	100
Duration of hospitalization		
1–2 days	124	77.5
3–7 days	26	16.3
>7 days	10	6.3
Total	160	100

Table 4: Distribution of demographic profile and causative factors of patients in febrile seizure according to seizure type

Characters	Age of patients	Seizure type		Total	*P*-value
		Complex%	Simple%		
Age	6–12 months	14 (26.9)	38 (73.1)	52	0.913
	12–24 months	17 (26.2)	48 (73.8)	65	
	24–60 months	10 (23.3)	33 (76.7)	43	
Sex	Male	31 (26.5)	86 (73.5)	117	0.677
	Female	10 (23.3)	33 (76.7)	43	
Family history	Present	16 (30.2)	37 (69.8)	53	0.352
	No	25 (23.4)	82 (76.6)	107	
Age at first seizure	<12 months	0	103 (100)	103	0.000*
	>12 months	41 (71.9)	16 (28.1)	57	
Seizure frequency	1	20 (31.7)	43 (68.3)	63	0.153
	>2	21 (21.6)	76 (78.4)	97	
Etiology of fever	URTI	35 (25.4)	103 (74.6)	138	0.849
	AGE	6 (27.3)	16 (72.7)	22	
Duration of seizure	<15 min	19 (13.8)	119 (86.2)	138	0.000*
	>15 min	22 (100)	0	22	
Duration of hospital stay	1–2 days	13 (10.5)	111 (89.5)	124	0.000*
	3–7 days	19 (73.1)	7 (26.9)	26	
	>7 days	9 (90.0)	1 (10.0)	10	

*$P<0.05$, significant

Sex distribution of the children in our study showed a definite male predominance 73.12% which was comparable to a study that had shown 74% of study population were male.[17] Such male predominance had been shown in other literatures.[23-26] The present study also reemphasized male predominance in febrile seizure. No satisfactory explanation for male sex predominant was found in any published literature.

In the present study majority of cases, 74.4% had simple febrile seizure, and remaining 25.6% had complex febrile seizure. Different studies had observed simple febrile seizure and complex febrile seizure in 76.7%, 23.3%, and 80%, 20%, respectively, which was comparable to our study.[26,27] Most of convulsions occur within 24 h of onset of fever. The present study showed high incidence of seizure in younger children with a decreasing trend in older children which is in agreement with other studies.[20,21] Previous studies have also described generalized seizure as the most common seizure. Our study showed that majority of children had generalized tonic-clonic seizure as the most frequent presenting seizure. In this study, 64.4% of children had single episode of seizure which was comparable to the result of 72.8% of children in a study.[26] Previous studies had also reported single episode of seizure in their studies.[12,16,21,22]

Different studies had shown that causes of fever vary depending on geographical region. The most common causes of fever in our study were upper respiratory tract infection 86.3% and gastroenteritis 13.8%. The study population showed upper respiratory infection as the most frequent cause of febrile convulsion. Upper respiratory infection 74.29% and gastroenteritis (11.68%) were the commonest cause of fever in one study which was comparable to our study.[20] Similar other studies also reported upper respiratory infection as the major infective etiology of febrile seizure.[12,13,18,21,29] The important viral or bacterial infection causes of febrile seizures in various studies in Iran were upper respiratory infection 42.3%, gastroenteritis 21.5%, otitis media infections 15.2%, pneumonia 8.7%, urinary tract infections 3.2%, roseola 2.0%, and other infections 12.8%.[28]

There are two seasonal peaks in FS incidence: November – January, corresponding to the peak of viral upper respiratory infection, and June- August, when common viral gastrointestinal illnesses occur.[24] Variation in prevalence is related to differences in case definitions, ascertainment methods, geography, and cultural factors.[25] In this study population number of febrile seizures was more prevalent in the month of June 17.5%. Other studies conducted in Finland and Iran showed that seizures were more prevalent in winter.[18,19]

Family history of seizures varied from 0.4% to as high as 20.6% of children with febrile seizure as reported in previous studies.[20-22] In the present study 33.1% of children had family history of febrile seizure which was similar to a study that had shown family history in 30% of cases.[31] Complex febrile seizure was more common in children who had first episode of seizure after 12 months of age ($P = 0.000$). Children with seizure duration lasting more than 15 min had higher prevalence of complex febrile seizure ($P = 0.000$). Our study also revealed that complex febrile seizure was more in children who stayed longer at the hospital following seizure episodes ($P = 0.000$). The patients stayed on an average of 3.1 days in the ward with the minimum stay being 1 day and the maximum 18 days.[16] This finding was comparable to the present study with a minimum hospital stay of 1–2 days.

Being a cross-sectional study, we had few limitations while collecting the detailed history of seizure characteristics in few cases as there were missing records and also a small sample group with short duration of study.

CONCLUSIONS

We concluded from the present study that febrile seizure was one of the most common causes of pediatric hospital admissions. The most common type of seizure was simple febrile seizure predominantly affecting male child below 2 years of age. Incidence of febrile seizure decreased with age. Generalized tonic-clonic seizure was the most common presentation of febrile seizure. Majority of first episode of febrile seizure occurred in the age group of 12–24 months. The most common precipitating factors for febrile seizures were upper respiratory infection and gastroenteritis. Despite our limitations, the study provided an insight in identifying the cause of fever and the need for parental education and counseling for the prevention of febrile seizure.

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