

Clinical Profile of Children with Febrile Seizures in A Tertiary Care Institute in Central India: A Descriptive Study

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Abstract:

Background: Febrile seizures is a common problem in children below 6 years. This study was conducted to evaluate the clinical profile of children presenting with febrile seizures and to identify risk factors for recurrence of febrile seizures in these children.

Materials and Methods: A Retrospective and prospective case record based study were conducted in a tertiary care center in a department of pediatrics after taking approval from institutional ethical committee. Convenience sampling method was used. Data and descriptive analyses were done using statistical package for the social sciences version 25. Point estimate at 95% confidence interval was calculated along with frequency and percentage for binary data.

Results: Out of total 11250 children admitted in pediatric ICU/wards 470 have febrile seizures. We enrolled 364 children in study, out of them, 200 (55%) male and 164 (45%) female with 309(84.9%) simple and 55 (15.1%) complex febrile seizure. Peak age was found in 6 month to 18 month age group 210 (57.7%), Recurrent febrile seizure noted in 117(32.1%) children and fever in more than half the cases 225 (61.9%) was caused by viral fever followed by Upper Respiratory Tract Infection 77(21.4%). Clobazam prophylaxis were taken intermittently in 358(98.4%) cases. Anemia was found in 72% of cases.

Conclusions: Simple febrile seizure was more common and the peak age of presentation 18 month of life and more commonly in male. One third of febrile seizures were recurrent and half the children had Viral fever as the most common etiology of fever followed by febrile upper respiratory tract.

Keywords: Febrile seizures, Electroencephalogram, magnetic resonance imaging, childhood epilepsy.

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Introduction

Febrile seizures as defined by The International League Against Epilepsy (ILAE) as “seizures occurring in childhood after one month of age, associated with a febrile illness not caused by an infection of the central nervous system, without previous neonatal seizures or a previous unprovoked seizure, and not meeting criteria for other acute symptomatic seizures[1].

Febrile seizures (FS) are the single most common seizure type and occur in 2 to 5% of children younger than age 5 years with a peak incidence in the second year of life [2]. Febrile seizure is a major challenge in pediatric practice because of its high incidence young children and its tendency to recur. In India, the prevalence of febrile seizures is around 8% and average risk of recurrence is around 30-40% [3]. Risk factors for recurrence is age less than 18 months, duration of fever less than one

hour before seizure onset, first degree relative with febrile seizure, low temperature associated with seizure[4].

In recent years, there has been more awareness about the potential complications of febrile seizures and management of this condition. Updated guidelines for the evaluation and management of febrile seizures were published by the American academy of pediatrics(AAP) and the Japanese Society of child, Neurology in 2011 and 2015, respectively [5,6] This article provides an update on current Knowledge about febrile seizures and outlines an approach to their evaluation and management.

Methods

This retrospective and prospective case record based study was conducted in a tertiary care

teaching hospital in Central India after approval from institutional ethical committee from 01 July 2012 to 31 March 2017. Children between 3 month to 6 years with febrile seizures as per definition of ILAE were enrolled for this study after obtaining written informed consent from parents. Clinical history was obtained from case records as per the standard proforma and investigations like complete blood picture, blood sugar, serum calcium, serum electrolytes were noted in retrospective cases and sent in prospective cases. Cerebrospinal Fluid (CSF) study was done when indicated. CT Scan Brain/MRI Brain and EEG were done only if there were features indicating alternative diagnosis. Patients with incomplete clinical data regarding seizure type and duration, previous history of Afebrile seizures, associated alternative diagnosis or those left against medical advice were excluded.

Information collected based on the patients' demographic and clinical data regarding type of seizure, duration, number of episodes, interval from onset of fever and seizure episode, past episodes of febrile seizure, family history of febrile seizure cause of fever and hemoglobin level at the onset of seizure.

Febrile seizure was labeled as simple, complex and recurrent. Simple is a short generalized seizure, of duration of less than 15 minutes, not recurring within 24 hours, occurring during a febrile episode whereas complex is a focal or generalized and prolonged seizure, of duration of greater than 15 minutes, recurring more than once in 24 hours, and/or associated with post-ictal neurological abnormalities. That child who had a past history of at least one febrile seizure and admitted with another episode of febrile seizure was regarded as recurrent febrile seizure. Children considered anemic when his/her hemoglobin recorded below 11mg/dl.

Statistical analysis

Data entered using Microsoft Excel sheets and analyzed using Statistical Package Social Sciences version 25. Descriptive statistical tools like frequency, percentage and tables were used to express the result. Point estimate at 90% confidence interval was calculated along with frequency and percentage for binary data.

Results

A total 11250 children were admitted during the study period. Among them 470 had febrile seizures out of which 364 were enrolled in the study. Out of them, 200 (55%) were male and 164 (45%) were female children with the proportion male to female 1.2:1. The peak age was between 6 months to 18 months. Simple febrile seizures were seen in 309 (84.9%) children and complex seizures in 55(15.1%) cases. Of them, recurrent febrile seizure noted in 117 (32.1%) children while remaining 247 (67.9%) presented with first episode of febrile seizure (Table 1). Among the recurrent febrile seizure 62(17.03%) children presented with first recurrence, 40 (10.9%) presented with second recurrence, 12 (3.2%) presented with third recurrence and remaining four presented with fourth or more seizure recurrence (Table 3).

Generalized tonic clonic seizures were present in 358 (98.4%) cases and rest was focal seizures. 1.9% of children had family history of febrile seizure (Table 1). Viral fever was the most common cause of fever in children (61.9%) followed by febrile upper respiratory tract infection (21.4 %) and acute gastroenteritis (8.8%) table 2. In our study, most of the children i.e. 348 (95.6%) had seizure duration between 0 to 5 minutes. 2.8 % of children (10 cases) had history of seizure duration between 5 to 30 minutes. Only few cases 1.6% came in status epilepticus with duration of seizure more than 30 minutes. (Table 5).Intermittent Clobazam prophylaxis were taken in 358 cases (98.4%) and 6 cases received continuous prophylaxis. Anemia was reported in 72% of cases. Investigations performed most commonly included CBC and serum electrolytes. CBC showed abnormalities suggestive of an infection in 48% cases. 262 (72%) cases were anemic. Lumbar puncture was performed in those who demonstrated signs of meningeal irritation or those who were younger than 1 years of age. Only one child had a positive cerebrospinal fluid (CSF) culture confirming meningitis. An EEG was performed on 22 children with complex febrile seizures and febrile status, which were normal in 16 or showed minor nonspecific changes in 3 cases. MRI Brain was done in 2 cases, report was Normal.

Table 1: Clinical Characteristics of febrile seizures in children

Variable	Categories	Febrile seizure	Percentage %
Sex	Male	200	55%
	Female	164	45%
Age	3- 6 months	09	2.5%
	6-18 months	210	57.7%
	18 months-6 year	145	39.8%
Type of seizure	Simple febrile	309	84.9%
	Complex febrile	55	15.1%
	GTCS	358	98.4%

	Focal	6	1.6%
Recurrence	First episode	247	67.9%
	Recurrent episode	117	32.1%
Duration of seizure	0-5 min	348	95.6%
	5-30 min	10	2.8%
	>30 min	06	1.6%
Types of prophylaxis (clonazepam)	Intermittent	358	98.4%
	Continuous	06	1.6%
Anemia (Hb<11 gm/dl)	Present	264	72%
	Absent	102	28%

Table 2: Etiology that triggered fever among the children with febrile seizures

Etiology	Percentage (n=364)
Viral fever	61.9%
Upper Respiratory Tract Infection	21.4%
Acute Gastroenteritis	8.8%
Urinary Tract Infection	4.9%
Others (wari 03, dysentery-02, malaria-01, measles-01, pneumonia-01, acute laryngo trachea bronchitis -02, post dpt vaccination-01)	3%

Table 3: Distribution of Recurrent febrile seizures by number of episodes

Episodes of recurrent febrile seizures	N (%) N=364
First recurrence	62(17.03%)
Second recurrence	40(10.9%)
Third recurrence	12(3.2%)
Fourth or more recurrence	03(0.8%)

Table 4: Atypical features in complex febrile seizures

Atypical features in complex febrile seizures	No of cases
Seizure reappeared within 24 hr	27 Cases
Seizure duration prolonged >15 min	10 Cases
Focal seizures	6 Cases
Status epilepticus	6 Cases
Neurological abnormality	6 Cases
More than one atypical features	3 Cases

Table 5: Duration of febrile seizures

Duration of seizure	Percentage	No of Cases
0-5 minute	95.6%	348
5-30 minute	2.8%	10 cases
>30 minute	1.6%	6 cases
Total	100	364

Discussion

In the present study, the majority of cases of FSs occur in the second year of life, peaking at 6 - 18months. This is in agreement with the results of other studies.(7-9) FSs are age-dependent and this age should be regarded as critical for developing FSs. Males account for 64% of cases with a male to female ratio of 1.7:1. In India the prevalence of febrile seizure is around 8%. Simple febrile seizure is more common than complex febrile seizure in different studies worldwide [10,11]. While a study from Nepal showed simple febrile seizure and complex febrile seizure in 80% and 20% of children respectively this was comparable to our study [12]. Our study revealed that febrile seizures were more common in males than females with male to female ratio of 1.2: 1 which is consistent to

study done by Naik et al in Kashmir [13]. Generalized seizure was the most frequent seizure found in various study [14, 15], in our study also most common form of seizure was generalized type. Majority of children in this study had single episode of seizure which was similar to previous studies. [16,17]. Only 1.9% positive family history of febrile seizure was found and was not significantly associated with the seizure recurrence.

However, it should also be noted that parents may be unaware of their past episodes of febrile seizure and thus may confound the exact family. In our study viral fever was the most common cause of fever followed by upper respiratory tract infection which is in consistent with the study done by Ojha A R et al in Kathmandu [18] Recurrence of seizure is one of the major concerns in children with febrile

seizure. This study showed recurrence in 32.1% of children which was comparable to 37% in another study [19]. Children with first episode of febrile seizure at an age below one year or below was found to have significantly increased likelihood of recurrence. Recurrence has been associated with early age of onset and family history, complex febrile seizure [4] while another study correlates recurrence with low temperature at onset of seizure and duration fever of <12 hours prior to onset of seizures [3,14]. Biochemical, hematological investigations and lumbar puncture for cerebrospinal fluid were performed when indicated clinically as per guidelines. Blood counts and serum electrolytes were not found to be statistically significant in the children with febrile seizure which is consistent with study done by Shrestha et al. Family history of epilepsy also varied from 0.4% to as high as 20.6% of children with febrile seizure as reported in previous studies. [16,17].

Recurrence is common and average risk of recurrence is around 30-40% [22]. Risk factors for recurrence is age less than 18 months, duration of fever less than one hour before seizure onset, first degree relative with febrile seizure, low temperature associated with seizure. [23] Most febrile seizure are brief, do not require any specific treatment or workup and have benign prognosis. It is generally accepted that admitting such a child should be reserved for those with recurrent or long atypical seizure, with an underlying serious infection, or where parental anxiety and other social circumstances indicate. A considerable number of children 72% in our study were anemic.

The association between iron deficiency anemia and FSs was studied by many authors; some of them confirm this association, and the others conclude that the risk of FSs occurrence in anemic children seems to be less common than in children who do not suffer from anemia [24-26] This study had inherent limitations being a hospital based study. Recall bias regarding history of febrile seizures in parents as well as exact duration of seizure and details of first episode of febrile seizure could not be minimized and these patients were not followed up to determine the risk of epilepsy. Population based studies are needed to evaluate an exact incidence of febrile seizure in children. While prospective studies with follow up of patients after first episode of febrile seizure would be of great value to identify factors determining the recurrence and its relation to future epilepsy in children.

Conclusion

The Simple febrile seizure was the most common type of febrile seizure predominantly affecting

children below 6 years of age. The peak age for first episode was found in 6 to 18 months age group. Recurrence of febrile seizure was common and was significantly associated with the age of the first episode at one year or below. Hence it is recommended that parents of patients with the first episode of a febrile seizure occurring at an age of one year or below should be appropriately counselled regarding seizure recurrence and measures during seizure activity as well as benign nature of the illness; which might reduce parental anxiety during further episodes of febrile seizure.

Ethical approval –The study was approved by the Institutional Ethics Committee.

References

1. ILAE. Guidelines for epidemiologic studies on epilepsy, Commission on epidemiology and prognosis, International League against Epilepsy. *Epilepsia* 1993; 34(4): 592-596.
2. Shinnar S. Febrile Seizures and Mesial Temporal Sclerosis. *Epilepsy Curr.* 2003; 3(4):115–118.
3. Farwell J, Blackner G, Sulzbacher S, Adelman L, Voeller M, First febrile seizures *Clin Pediatr (Phila)* 1994; 33(5): 263-67.
4. Berg A, Shinnar S, Darefsy A S, Holford T R, Shapiro E D, Saloman E D et al “predictors of recurrent febrile seizures. A prospective cohort study, *Arch pediatradolesc med* 1997; 151(4): 371-78.
5. McLntyre PB, Cray SV, Vance JC. Unsuspected bacterial infections in febrile convulsions. *Med J Aust.* 1990; 152(4):183–6.
6. Trainor JL, Hampers LC, Krug SE, Listernick R. Children with first- time simple febrile seizures are at low risk of serious bacterial illness. *Acad Emerg Med.* 2001; 8(8):781–7.
7. Annegers JF, Hauser WA, Shirts SB, Kurland LT. Factors prognostic of unprovoked seizures after febrile convulsions. *N Engl J Med.* 1987 Feb 26; 316(9):493-8.
8. Hauser WA. The prevalence and incidence of convulsive disorder in children. *Epilepsia.* 1994; 35(suppl 2):S1-6.
9. Offringa M, Hazebroek-Kampschreur AA, Derksen- Lubsen G. Prevalence of febrile seizures in Dutch school children. *Paediatr Perin Epidemiol.* 1991 Apr;5(2):181-8
10. Stanhope J, Brody J, Brink E, Morris C, Convulsions among the Chamorro people of Guam, Mariana Islands, *Am J Epidemiol* 1972; 95(3): 299-304.
11. Tsuboi T, Epidemiology of febrile and afebrile convulsions in children in Japan, *Neurol* 1984; 34(2):175-181.
12. Ojha A, Shakya K, Aryal U. Recurrence of febrile seizures in children, *J Nepal Paediatr Soc* 2012; 32(1):33-6.

13. Naik S , Jan M ,Rafiq W, Syed T, Alexander K, Mudasir M et al : Febrile convulsions in preschool children in Kashmir ,Int J Contemp pediater 2015 Aug;2(3): 213-215
14. Aliabad G, Khajeh A, Fayyazi A, Safdari L, Clinical, epidemiological and laboratory characteristics of patients with febrile convulsion. Journal of Comprehensive Pediatrics.2013; 3(4):134-7.
15. Mustafic N, Tahirovic H, Trnovcevic J, Kapidzic A. Clinical characteristics at onset of first febrile convulsions. ActaMed Croatica. 2008; 62(5):511-5.
16. Winkler A, Tluway A, Schmutzhard E. Febrile seizures in rural Tanzania: hospital-based incidence and clinical characteristics. J Trop Pediatr. 2013; 59(4):298-304.
17. Deng C, Zulkifi H, Azizi BHO. Febrile seizures in Malaysian children: Epidemiology and clinical features. Med JMalaysia. 1994; 49(4):341-7.
18. Ojha A, Shakya K, Aryal U. Recurrence risk of febrile Seizure in children. J Nepal Paediatr Soc. 2012; 32(1):33-6.
19. Fallah R, Karbasi S. Recurrence of febrile seizure in Yazd, Iran. Turk J Pediatr. 2010; 52(6):618-22.
20. Shinnar S and O'Dell C. Profiles in Seizure Management. In:Leppik IE ed. Managing Febrile Seizures in Young Children and Epilepsy in the Elderly. Princeton Media Associates. 2003: 3-15.
21. Parmar RC, Sahu DR, Bavdekar SB. Knowledge, attitude and practices of parents of children with febrile convulsion. J. Postgrad. Med. 2001; 47: 19-23.
22. TsuboiT, Epidemiology of febrile and afebrile convulsions in children in japan, Neurol 1984; 34(2):175-181.
23. Rich S, Annegers J, Hauser W, Anderson V. Am J Hum Genet 1987; 41:249-57.
24. Billoo AG. Association between iron deficiency anemia and febrile seizures. J Coll Physici Surg Pak: JCPSP. 2005 Jun; 15(6):338-40.
25. Daoud AS, Batieha A, Abu-Ekteish F. iron status: a possible risk factor for the first febrile seizures. Epilepsia. 2002; 43:740-3.
26. Talebian A, Momtazmanesh N, Mosavi SG, Khojasteh MR. Relationship between febrile seizure and anemia. Iran J Pediatr. 2006; 165:79-82.