



CLINICAL STUDY OF FIRST EPISODE FEBRILE SEIZURE IN CHILDREN UNDER 5 YEARS FROM NORTH INDIA WITH SPECIAL EMPHASIS ON CT SCAN AND EEG FINDINGS: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT **Objective:** To study the clinical characteristics and analyze role of EEG and CT scan in children with first febrile seizures
Methods: It was a prospective observational study conducted between July 2013 to December 2014. Children between 1 month to 5 years with first febrile seizures were enrolled. Clinical data was recorded in a proforma. Hemogram and EEG were done in all patients. Lumbar puncture was done in eligible children and CT scan was done in patients with abnormal neurological status.
Result: 50 children were analyzed. The mean age of children was 19.5 months. M:F ratio was 2.1:1. Upper respiratory tract infections were the most common cause of fever. 92% children had simple seizure. 6 children had family history of febrile seizures. Of the children in whom hemoglobin levels were <7 (9), 6 children had complex febrile seizure and 3 had simple febrile seizure. EEG findings were normal in 68% children. Amongst the children with abnormal EEG, 75% did not have any recurrence. Lumbar puncture was done in 25 children and all had normal findings. CT scan was done in 3 children and findings were normal in all.
Conclusion: Febrile seizures are usually self limiting. Most of the patients with febrile seizure with anemia had complex seizure. Investigations including CSF analysis, EEG and neuroimaging should not be routinely done and should be individualized on case to case basis.

KEYWORDS : Febrile seizures; EEG; CT scan

INTRODUCTION

Febrile seizures are one of the most common causes of seizure in children under 5 years of age. It affects 2-5% of population.[1]. Febrile seizures are a separate entity from other type of convulsion in early childhood. The International League Against Epilepsy (ILAE) defines febrile seizure as "a seizure 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 seizure or a previous unprovoked seizure, and not meeting criteria for other acute symptomatic seizures.[2]. They most commonly occur between 6 months and 5 years with a peak incidence between 12 to 18 months of age and are classified into simple and complex febrile seizure based on type, duration and number of episodes of seizures.[3]. Some of the risk factors for febrile seizures are sudden increase in body temperature, persistence of fever, prematurity, intrauterine growth retardation, prolonged nursery stay, minerals and vitamin deficiency, exposure to certain vaccines, past history and family history of febrile seizures.[3-5]. Febrile seizures usually don't cause developmental, intellectual, anthropometrical, neurological delay.[6]. Children with prolonged febrile seizures are more likely to have developmental abnormalities.[7]. Role of neuroimaging and EEG varies on case to case basis. Routine use of EEG in all cases of febrile seizures for diagnosis or future prediction of epilepsy is not recommended. Simple febrile seizures usually don't require any neuroimaging, however it may be required in complex seizures and febrile status epilepticus to rule out any other abnormality.[8] There are not many studies on the clinical profile of children with febrile seizures from North India. This study was conducted to identify clinical profile of children with first febrile seizures and identify EEG and neuroimaging findings in them.

METHODS

This prospective observational study was conducted in the Department of Pediatrics at tertiary care centre in Prayagraj. A clearance from ethical committee of the institute was obtained. Written informed consent was obtained from the family members for participation in the study. Children between 1 month to 5 years with first febrile seizures admitted between July 2013 to December 2014 were enrolled. Children who had a history of afebrile seizure, a past history of neonatal seizure, or having Static/Progressive neurological disorder were excluded. Eligible cases were evaluated with detailed clinical history and examination. Hemogram and EEG was done in all cases. Lumbar puncture was performed in children with either abnormal neurological examination, children with clinical signs of meningitis, children <18 months of age with first febrile seizure or children who had received prior antibiotics. Contrast enhanced CT scan was done in

patients with abnormal neurological status. These children were followed up till study completion for recurrence.

Statistical analysis

The data collected were compiled and master chart was prepared using Microsoft excel. Epi info7 software was used for the analysis of the data. Continuous data were presented using mean \pm standard deviation, while categorical data presented in frequency (%).

RESULTS

64 children who met the inclusion criteria were enrolled in the study. 3 children left the hospital in the middle of the study, parents of 3 children refused for the lumbar puncture, CT scan could not be done in 6 children due to financial constraints of the families and 2 children lost in follow up. Final analysis of 50 children was done (Fig 1). Table 1 and 2 represents proportion of children in each variable evaluated.

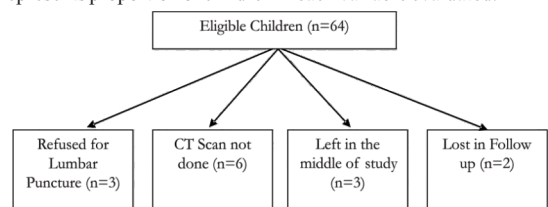


Fig 1: Study Population

Table 1: Age distribution

Age in months	Number of cases	Percentage
4-11 months	12	24
12-23 months	26	52
24-36 months	7	14
37-60 months	5	10

Table 2: Distribution according to different variables

Variable	Number of children(%)
Sex	
Male	34(68)
Female	16(32)
Religion	
Hindu	31(62)
Muslim	19(38)
Type of febrile seizure	
Simple	46(92)
Complex	4(8)

Recurrence	
Yes	10(20)
No	40(80)
Development	
Normal	50(100)
Abnormal	0(0)
Cause of fever	
URTI	38(76)
Gastroenteritis	10(20)
Others	2(4)
Family history	
Present	6(12)
Absent	44(88)
Hemoglobin levels(gm/dl)	
>7	41(82)
<7	9(18)
Type of seizure in patients with Hb<7	
Simple	3(33.3)
Complex	6(66.7)
Lumber puncture performed	
Yes	25(50)
No	25(50)
CSF analysis	
Normal	25(100)
Abnormal	0(0)
EEG reports	
Normal	34(68)
Abnormal	16(32)
Recurrence in patients with abnormal EEG	
Present	4(25)
Absent	12(75)
CT scan	
Done	3(6)
Not done	47(94)
CT scan reports	
Normal	3(100)
Abnormal	0(0)

DISCUSSION

In the present study maximum children (52%) belonged to 12-24 months of age with mean age of 19.5 months(4-60). Male to female ratio was 2.1:1. Studies done previously have shown similar results[9]. Increased risk of infections in this age group due to poor immunity and increased vulnerability of CNS to fever could be contributing factors. Most of the children belonged to Hindu community which can be attributed to the fact that most of the children visiting the hospital were Hindus. Upper respiratory tract, ear, nose, throat and gastrointestinal infections are most common causes of fever.[10] In the present study, cause of fever was upper respiratory tract infection in 76%, gastroenteritis in 20% and others in 4% children. Most of the children had simple febrile seizures(92%). This finding is consistent with results of other studies.[10]. 20 % had recurrence of febrile seizure. Wallace also observed that 47%(55/116) children with first febrile seizure had recurrence with subsequent febrile illness.[11]. In our study, in 12% children family history of febrile seizure was present. This proportion is lesser than seen in earlier studies which have found positive family history in 18-40% cases.[1,10]. In the laboratory parameters, 9 (18%) children had hemoglobin levels <7 gm/dl out of which 6(66.7%) children had complex febrile seizures while only 3(33.3%) children had simple febrile seizure which suggests that in children with low hemoglobin levels, complex febrile seizure was more common. Role of iron deficiency anemia in febrile seizures occurrence has been identified in past. Several case control studies and systemic reviews have shown statistically increased risk of febrile seizures in children with nutritional anemia.[12,13,14].

16 (32%) children had generalized seizure disorder in EEG out of which 12 children did not have any recurrence while 4 children had a repeat episode of febrile seizure which suggests that abnormal EEG is not predictive of future recurrence of febrile seizures. Studies have shown EEG abnormalities to be more common in complex than simple febrile seizures, however abnormal EEG findings are not predictive of future recurrence of febrile seizure or epilepsy.[15] In a Cochrane review in 2017, no suitable RCTs to support or refute the role of EEG in complex febrile seizures were identified.[16]. Specific EEG changes like focal and pseudo petit mal discharges have been identified as risk factors for recurrent febrile seizure and epilepsy.[17,18]. Lumbar

puncture was performed in 50% of children according to eligibility. None of them had abnormal CSF findings. Various studies have shown low incidence of meningitis in children with febrile seizures even in less than 18 months group.[19]. In a recent multicentric study on children with complex febrile seizures, none of the patients without clinical features of meningitis or encephalitis were found to have CSF analysis suggestive of meningitis or HSV meningoencephalitis. [20]. However, Son et al in a 10 year retrospective review of children with simple febrile seizure concluded that lumbar puncture is must in children less than 12 months even in absence of neurological signs.[21]. CT scan was performed in 3 patients; none of them had abnormal CT scan reports. According to literature neuroimaging is not recommended in the routine evaluation of febrile seizures.[8,22,23]. It may be performed in children with focal seizures, abnormal neurological status.[8].

There were some limitations of the study. Sample size was small. There were no details of recurrent episodes of febrile seizures. Treatment and prophylaxis data was not evaluated. Long term follow up of these children is required.

CONCLUSION

To conclude febrile seizures are usually benign childhood seizures. Identification of risk factors is important for prevention of its occurrence and recurrence. Parents should be adequately educated about the disease, its consequences and treatment and prevention options. Anemia being a common entity in childhood, randomized controlled trials need to be done to prove its role in precipitating febrile seizures. Investigations including CSF analysis, EEG and neuroimaging should not be routinely done and should be individualized on case to case basis.

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